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PIT AND QUARRY

MARCH, 1944

APR 3 1944

FOR 27 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

APR -1 1944

"The Perfect"

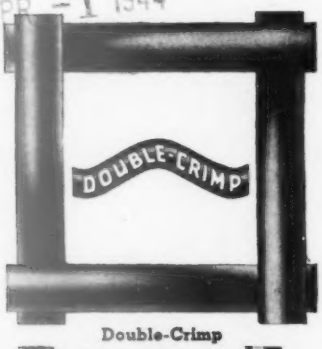
Wire Cloths and Screens

of

SUPER-LOY
STEEL
GALVANIZED STEEL
STAINLESS STEEL
NICKEL-CHROME STEEL
PHOSPHOR BRONZE
BRASS
COPPER
MONEL
NICKEL
ALUMINUM

•

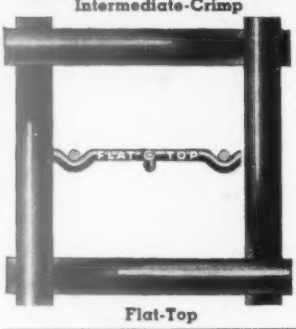
Any Special Metal for Any Service



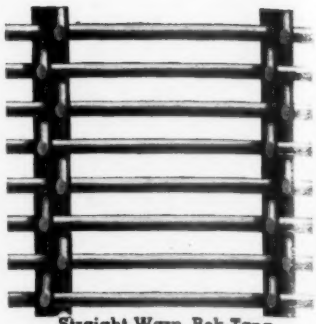
Double-Crimp

Arch-Crimp

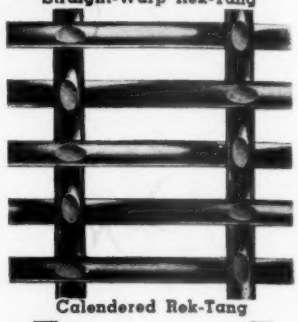
Intermediate-Crimp



Flat-Top

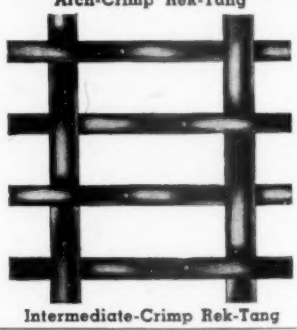


Straight-Warp Rek-Tang



Calendered Rek-Tang

Arch-Crimp Rek-Tang



Intermediate-Crimp Rek-Tang

"Perfect" WEAVES

Arch-Crimp
Coiled
Double-Crimp
Double-Fill
Dutch
Flat-Top
Intermediate-Crimp
Rek-Tang
Selvage-Edge
Straight-Warp
Stranded
Sta-Tru
Triple-Warp
Twilled
Twisted-Fill
Twisted-Warp

"Perfect" PROCESSING

Arc-Welding
Bending
Binding
Brazing
Calendering
Coiling
Crimping
Cutting
Dipping
Dishing
Finishing
Flanging
Flattening
Forming
Framing
Galvanizing
Jointing
Knuckling
Painting
Rolling
Selvaging
Shaping
Shearing
Slitting
Soldering
Spot-Welding
Squaring
Stitching
Tack Welding
Trimming

"Perfect" PRODUCTS

Baskets
Circles
Coils
Cones
Cylinders
Discs
Forms
Leaves
Lengths
Panels
Pieces
Ribbons
Rings
Rolls
Sections
Segments
Strips
Templates

Illustrations show items listed in bold-face type. Other wire cloths and screens will be illustrated in subsequent advertisements of this series.

Coil Screen

THE LUDLOW-SAYLOR WIRE CO.

ST. LOUIS 10, MISSOURI

Loading limestone in an EASTON patented model TR-10 (Trackless Mine Car).

213,800 MAN-HOURS without *Accident !*

MODERN methods and equipment are essential to every safety program. EASTON semi-trailers and equipment play a big part in the accident free production of limestone at this quarry.

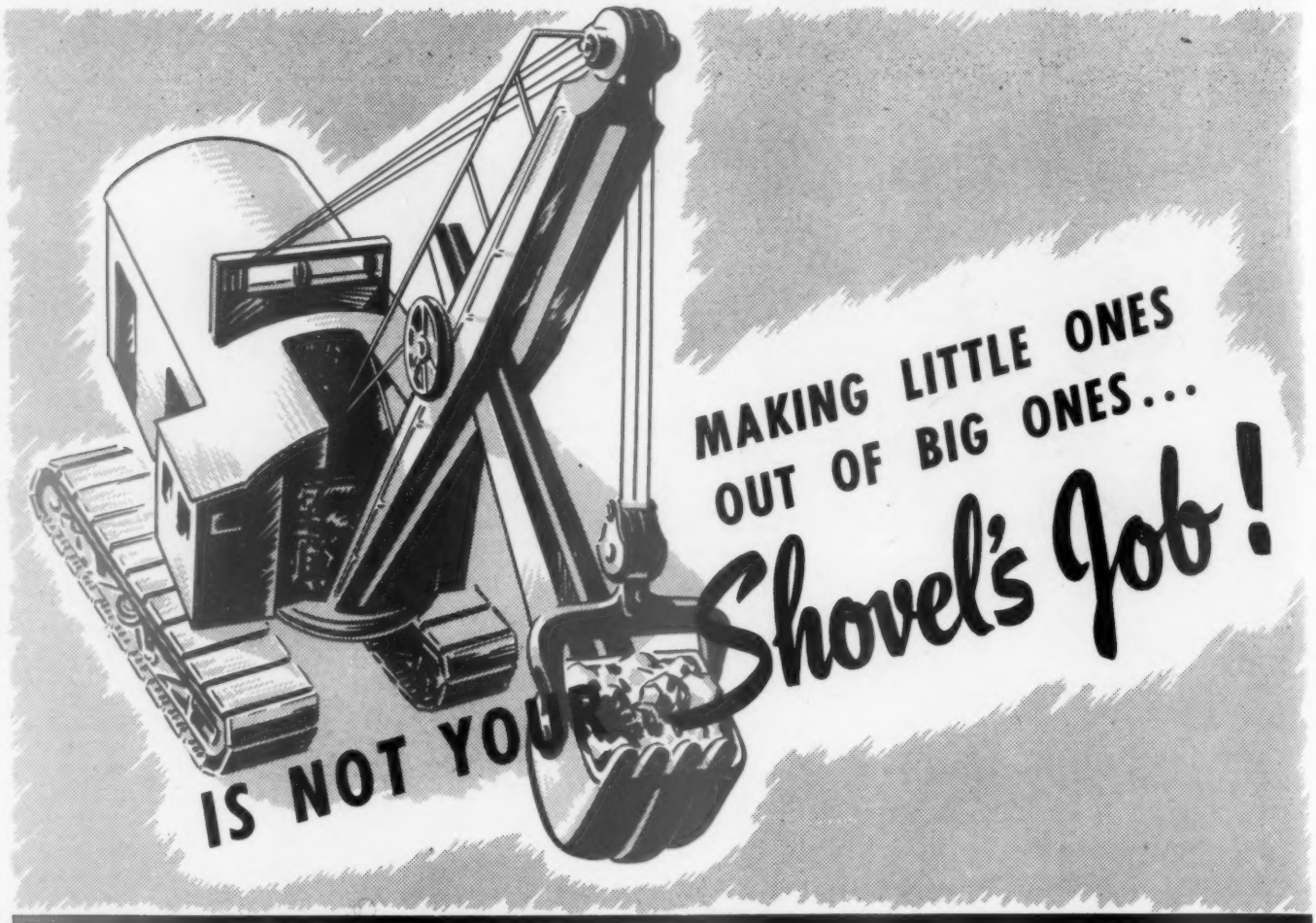
EASTON engineers are quarry-haulage specialists. Write to: Engineering Counsel, Easton Car & Construction Company, Easton, Pa.

EASTON

INDUSTRIAL CARS
TRUCK BODIES · TRAILERS
ELECTRIC LIFT TRUCKS

B-1011

PIT AND QUARRY, March, 1944, Vol. 36, No. 9. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago 5, Ill. Subscription price $2 for 1 year in the U. S. and possessions. Canada, Central and South America; elsewhere $1 additional for each year. Single copies 25 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.



● With the kind of fragmentation Detonite gives you, secondary blasting is reduced . . . you use less explosive per ton . . . your shovels are in continuous, efficient use.

For Detonite—the patented, surface-sensitized high explosive made only by The King Powder Co.—gives the heaving, spreading effect which brings down the stone in sizes right for your shovel . . . right for your crusher.

All we ask is an opportunity to demonstrate Detonite in your quarry—under your operating conditions. Write, wire, or phone us today (Cincinnati, MAin 4609, reverse charges) and make a date with a King representative. You'll use less explosive per ton . . . and your equipment will lead a longer and more useful life.

★ WAR BONDS HELP WIN WARS—BUY MORE TODAY! ★

KING EXPLOSIVES

THE KING POWDER CO. INC.
CINCINNATI 1, OHIO . . . . . INCORPORATED 1878

21 REASONS WHY LORAINS SET RECORDS IN ROCK!

MAYBE this is a good time to remind you thousands of Lorain Shovel and Crane owners why you chose Lorains when the market was still wide open . . . when anyone could *order* and *get* any make or model shovel they wanted. In those days, you bought Lorains because hard-boiled analysis of the facts disclosed at least twenty-one reasons* why Lorains possessed the power, strength and speed to dig at a profit. Here they are:

TURNTABLE

(1) Double Center Drive Pinion which (2) applies power directly—fully concentrated on any one operation or (3) spreads power for high-speed simultaneous operations. (4) Two-piece swing drums designed to take the punishment of the hardest worked parts of the shovel. (5) Crowd clutch extra wide to deliver full digging power, mounted on roller bearings.

CRAWLER

(6) Center "Chain Drive". (7) Two speeds either direction. (8) Steers either direction. (9) Mechanism runs in oil bath. (10) Generous underneath clearances. (11) Centralized lubrication. (12) Travel and Safety lock. (13) Wide treads.

SHOVEL BOOM

(14) All-welded (all-steel for maximum strength and torsion-resistance). (15) All-steel dipper stick. (16) Door stops to protect stick. (17) Automatic power dipper trip. (18) Automatic crowd brake to hold stick extended.

CRANES, CLAMS, DRAGS

(19) Simultaneous hoist, swing, and travel (or boom derricking). (20) High-speed boom hoist—power and precision control of boom derricking and lowering. (21) "Cable-Miser" fair-lead with interlocking, geared sheaves.

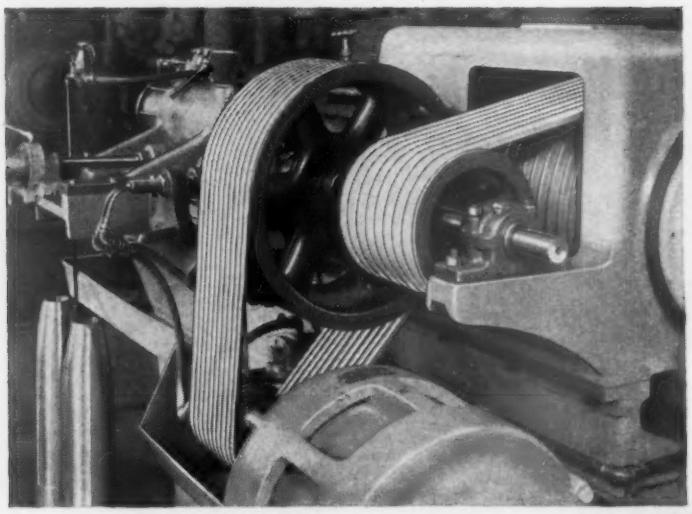
Right now you're watching Lorains "at war" pile up additional evidence of their ability to "hit the ball" under the toughest possible operating conditions. So, next time you need rock shovels, you'll have all the old reasons for choosing Lorains—plus some new ones. When that time comes, don't forget to get in touch with your nearby Lorain distributor at once.

**Points listed above apply to Lorain models 1½ yds. and up*

THE THEW SHOVEL COMPANY • *Lorain, Ohio*

thew-Lorain SHOVELS

CRANES • DRAGLINES • MOTO-CRANES



*Used in Many Industries

On this machine which profiles the outside of high-explosive shells, Gates V-Belts of special synthetic rubber are used because of their proved ability to withstand bad oil conditions. By actual records, on hundreds of installations where oil or heat conditions are severe, Gates special synthetic V-Belts are wearing 2 times to 3 times as long as any natural rubber belts ever used!

Widely Used* for Over 6 Years

GATES Synthetic Rubber V-Belts

—Have Proved *Superior*

Even to Belts of *Natural* Rubber!

Gates began making V-Belts entirely of synthetic rubber more than 6 years ago. Each year since then, thousands upon thousands of Gates synthetic rubber V-Belts have been making outstanding service records in aircraft factories, in steel mills, in ordnance plants, in machine parts factories—in fact, in practically every type of industrial plant in the nation.

This long *head-start* in the fabrication of synthetic rubber V-Belts was no accident. It was started deliberately, in peacetime and not under pressure of necessity. The synthetic rubber selected by Gates is a very *special* synthetic rubber—not in any sense merely a "substitute" for rubber. In certain very important applications it is *greatly superior* to natural rubber.

For example;—one special synthetic rubber selected by Gates has the unusual characteristic of 'withstanding oil and heat much better than even natural rubber. Where heat and oil conditions are especially severe, Gates special synthetic V-Belts are outwearing any natural rubber V-Belts by as much as 230%.

Of the very greatest importance to V-Belt users today is Gates' unusually long experience and success in making V-Belts of synthetic rubber. This is especially important now because the time has come when Gates' superior knowledge of synthetic rubber can be put to work for you right in your own plant.

You have only to look in your telephone directory and call the Gates Field Engineer. He will put at your service the full benefits of Gates' knowledge and experience without the slightest obligation.

443

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington
NEW YORK CITY 215-219 Fourth Avenue
ATLANTA, GA. 738 C & S National Bank Building
LOS ANGELES, CAL. 2240 East Washington Boulevard
DENVER, COLO. 999 South Broadway
DETROIT, MICH. 8663 Grand River Avenue
PORTLAND, ORE. 333 N. W. 5th Avenue
DALLAS, TEXAS 2213 Griffin Street
SAN FRANCISCO, CAL. 1090 Bryant Street

GULF PRODUCTS help Hardaway Contracting Co. finish rush job ahead of schedule

Hardaway Contracting Company, Columbus, Georgia, averaged over 10,000 yards per day in grading the extension runways on this airport construction project. Gulf quality lubricants and fuels helped this contractor finish the job well ahead of schedule.

"The efficient and dependable performance of our equipment with Gulf Lubricants and Fuels was an important factor in our fast progress," *says this contractor*

GULF quality lubricants and fuels played a big part in our finishing up this rush airport job ahead of schedule," says Superintendent Roy Geise of Hardaway Contracting Co. "Gulf products contributed to the outstanding efficiency record of our equipment, and helped us avoid delays caused by mechanical troubles."

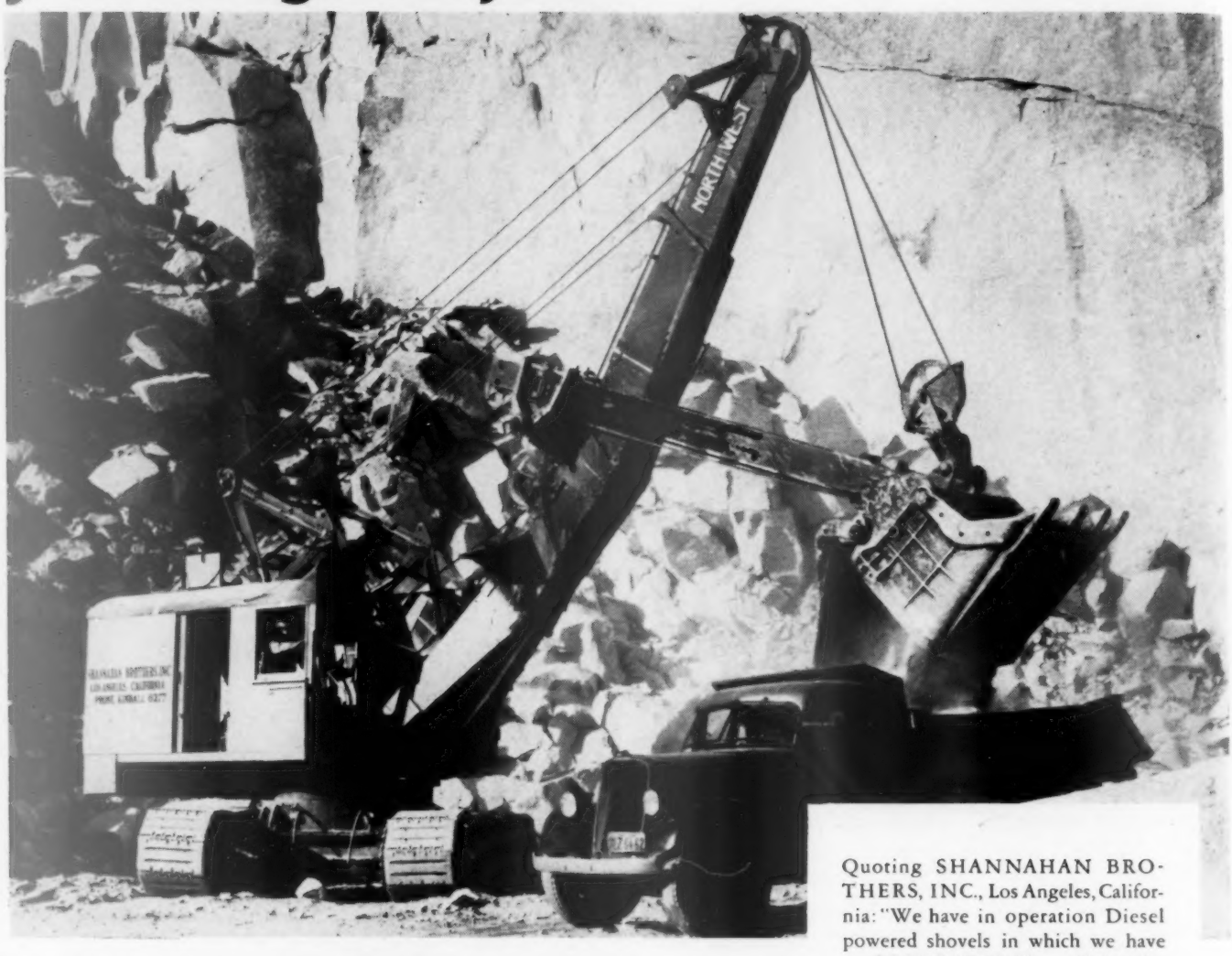
Here are some of the reasons why so many leading contractors rely on Gulf lubricants and fuels to help them beat contract schedules: Gulf lubricants have a performance-proven reputation for quality—they provide the kind of lubrication that means full protection to equipment under punishing service conditions. And Gulf fuels deliver full power. Result: efficient operation of every unit, long service life, low maintenance costs, and a minimum of costly operating delays.

Call in a Gulf Service Engineer before you go to work on your next contract—let him show you how Gulf quality lubricants and fuels can help you do a speedier, more profitable job. Write, wire, or phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION · GULF REFINING COMPANY · GULF BLDG., PITTSBURGH 30, PA.

Try RING-FREE on your toughest jobs!



If you're "from Missouri", put Macmillan RING-FREE Motor Oil in the crankcase of the motorized equipment that is subject to your severest test! Here is what it does:

Macmillan RING-FREE Motor Oil *removes* carbon while the engine runs! The result is a cleaner, more thoroughly lubricated, sweeter running engine. And continued use of RING-FREE keeps carbon in check.

Furthermore, RING-FREE Motor Oil reduces friction *fast!* Internal engine friction is reduced to the extent that it's measurable in fuel savings because more power is delivered to the drive shaft. The fast penetrating quality, high film strength, high heat resistance and long cling to metal of Macmillan RING-FREE—contributing to reduction of friction—cuts down wear and repair. It pays to improve the performance and lengthen the life of all types of Diesel and gasoline engines with RING-FREE!

Quoting SHANNAHAN BROTHERS, INC., Los Angeles, California: "We have in operation Diesel powered shovels in which we have used RING-FREE Motor Oil exclusively . . . while subjected to extremely difficult work.

"We do not hesitate to recommend RING-FREE for use in any heavy equipment, since we have found through experience that our repair and overhaul bills are practically nil."

MACMILLAN PETROLEUM CORPORATION

50 W. 50th Street, New York 20 • 624 S. Michigan Avenue, Chicago 5 • 530 W. 6th Street, Los Angeles 14

Copyright 1944, Macmillan Petroleum Corp.

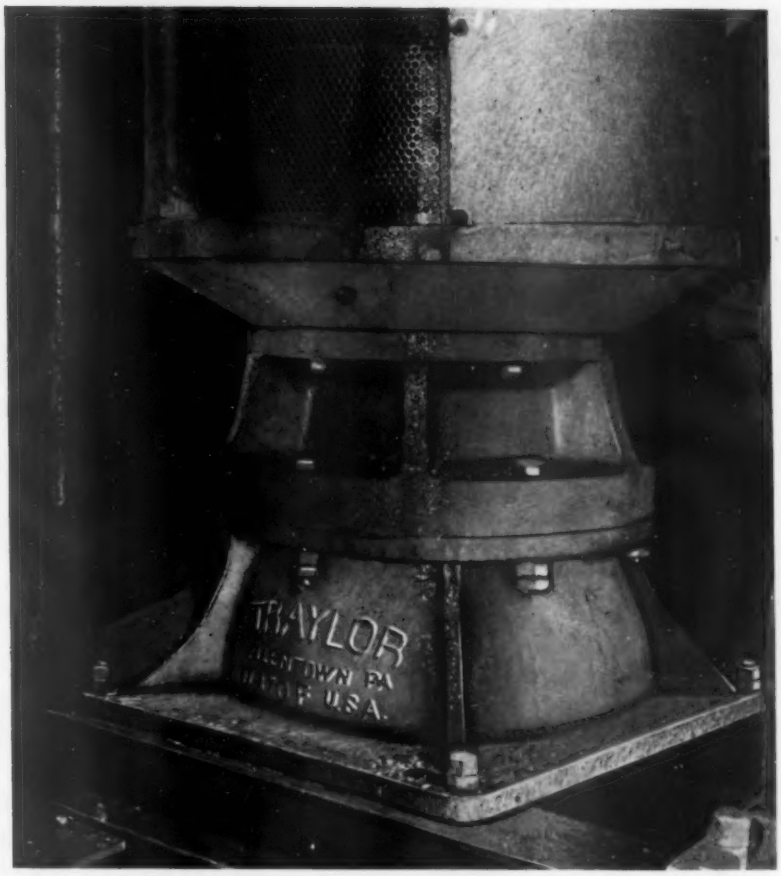
MACMILLAN RING-FREE MOTOR OIL

REDUCES WEAR BY REDUCING FRICTION

TRAYLOR

Type TY

REDUCTION CRUSHER



WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

EIGHT separate, exclusive features of this great crusher add up to these advantages that enable owners to reap extra profits:—(1) it delivers exactly the kind of product required, of the right size, in satisfying capacity; (2) it has strength enough, and to spare, to stand up under its job (built of steel throughout); (3) it extracts the last ounce of wearing metal (the patented Bell Head and Curved Concaves take care of this by eliminating choking), it is otherwise inexpensive to maintain (automatic force-feed lubrication), and it is economical in the use of power (cut gearing and roller bearings); (4) it is fool proof (assured by protective devices against dust and tramp metal).

Write us — today for the whole story!

Have our representative in, to show you the records the TY has made!

WRITE FOR BULLETIN 3112

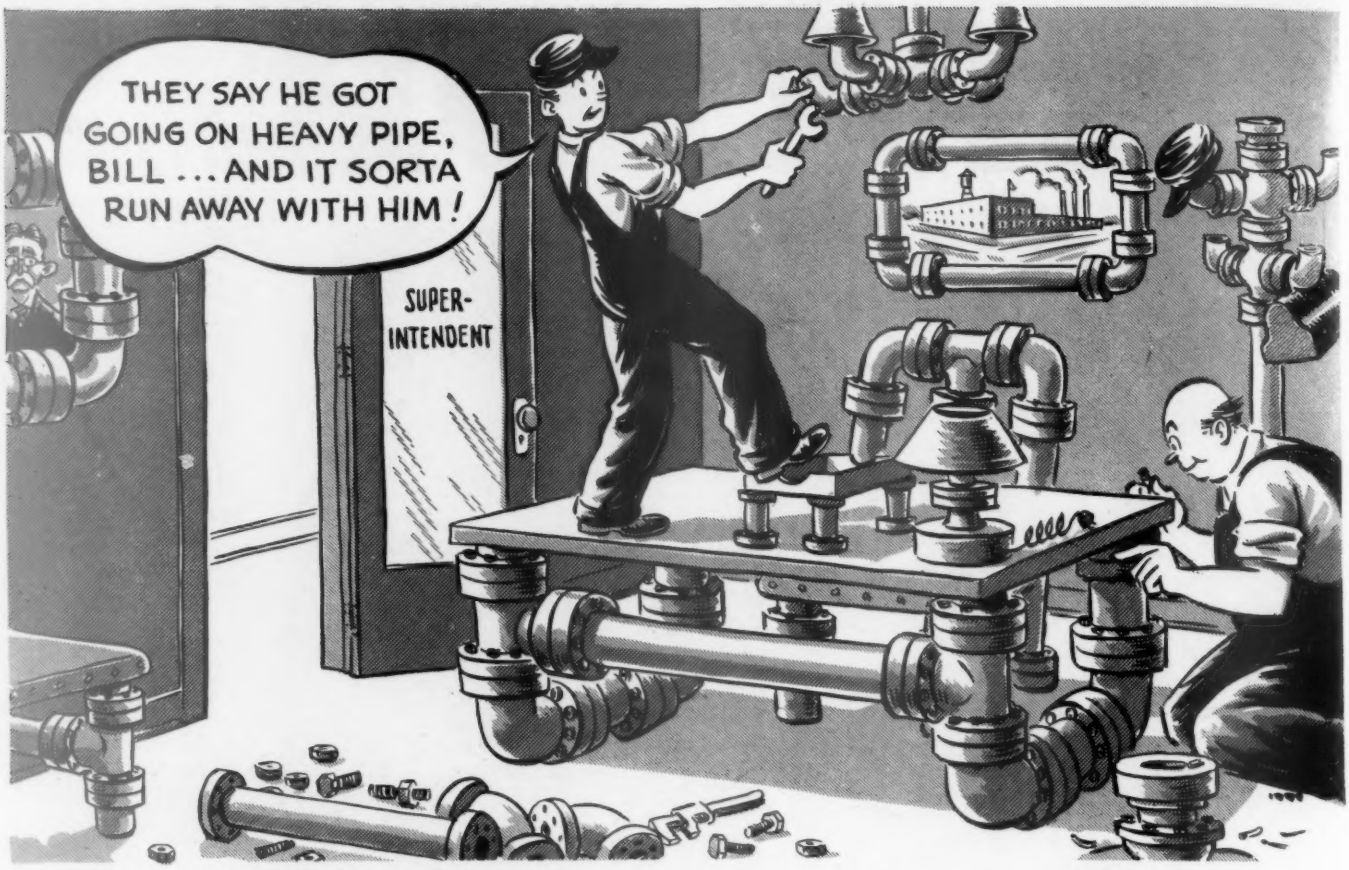
TRAYLOR

ENGINEERING & MANUFACTURING CO.
MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

NEW YORK CITY 3416 Empire State Bldg.
CHICAGO 2051 One La Salle St. Bldg.
SALT LAKE CITY 101 West Second South St.
LOS ANGELES 919 Chester Williams Bldg.
SPOKANE S. 2707 Rhyolite Rd.

B. C. EQUIPMENT CO., LTD.
551 Howe St., Vancouver, B. C.

Export Department — 104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Rio de Janeiro, Buenos Aires, Santiago, Antofagasta, Oruro, Montevideo.



Have YOU gone too far with heavy pipe?

WHEN we say heavy pipe we don't mean the "Extra Heavy" kind. We just mean the ordinary, everyday "Standard Thickness" pipe that is used for a multitude of services. In relation to *most* of the purposes it serves in *most* plants, it *is* heavy —far heavier than needed!

Miles of this pipe are used for that broad middle range of low and moderate pressure services—services like those listed here. Yet there is a pipe, weighing about half as much, that can handle any of these requirements with strength and service life to spare—a pipe which can often be installed at half the cost of the heavier pipe it so well replaces.

This pipe is Taylor Spiral!

When you use this light but remarkably strong pipe you not only save dollars; you also conserve vital steel. Switching to Taylor Spiral for services like those listed is made easy by the range of sizes and variety of fittings. Thicknesses range from 18 to 6 gauge; sizes from 4" to 42"; joint lengths to 40 ft. All types of end joints and couplings, all kinds of fittings and "specials" or fabricated assemblies are produced by Taylor Forge, assuring a complete service with undivided responsibility.

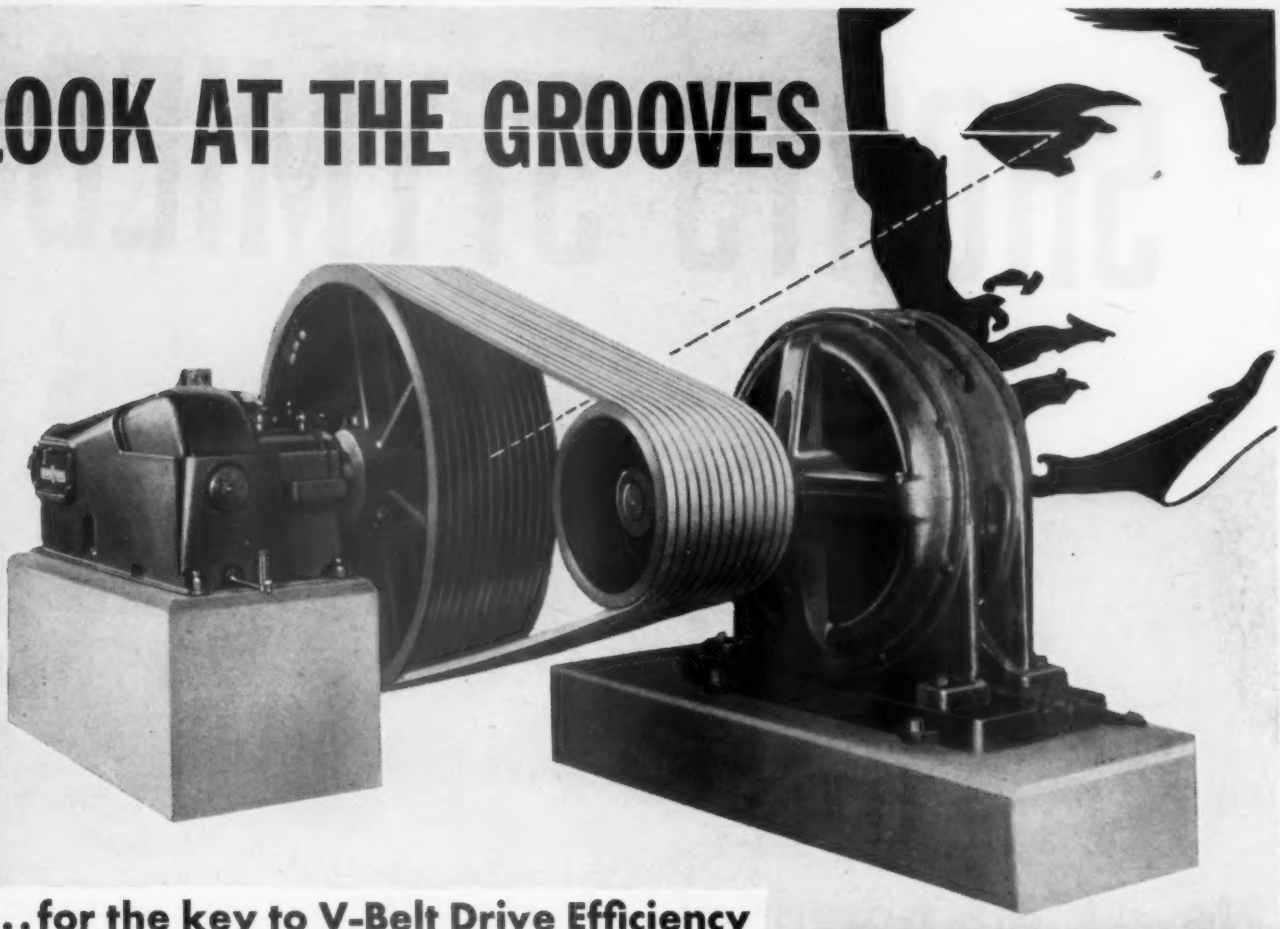
TAYLOR FORGE & PIPE WORKS

General Offices & Works: Chicago, P. O. Box 485 ★ New York Office: 50 Church St. ★ Philadelphia Office: Broad Street Station Bldg.

CHANGE TO TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines
- Low Pressure Steam and Air Lines
- Steam and Diesel Exhaust Lines
- Vacuum and Suction Lines
- Blower Piping
- Sand and Gravel Lines
- Industrial Gas Lines
- Oil and Gas Gathering Lines
- Swing Pipe
- Spray Pond Piping
- Hydraulic Mining
- Dredge Lines

LOOK AT THE GROOVES



...for the key to V-Belt Drive Efficiency

Only sheave grooves that are precision machined, accurately spaced and absolutely true, with side walls at perfectly uniform angles can make possible a really efficient V-Belt Drive. Wood's Sheaves are just that kind—engineered to provide for a snug fit and firm grip by the V-Belts.

The full molded belts on a Wood's drive are flexible and resilient matching the grooves perfectly. The harder the pull the greater their wedging action and the higher their percentage of efficiency . . . 98% is not uncommon.

There are large assortments of sheave sizes and standard V-Belts always on hand in Wood's warehouses. In most cases, requirements can be made up from stock drives for immediate shipments. Also special sheaves with extra weight for flywheel effect, bolting flanges and other special features to permit sheaves to form integral parts of customers' machines can be made from array of flexible patterns right here in Chambersburg. No extra expense to customer for pattern equipment. Our 64-Page V-Belt catalog describes fully the Wood's V-Belt Drive. Send for a copy.

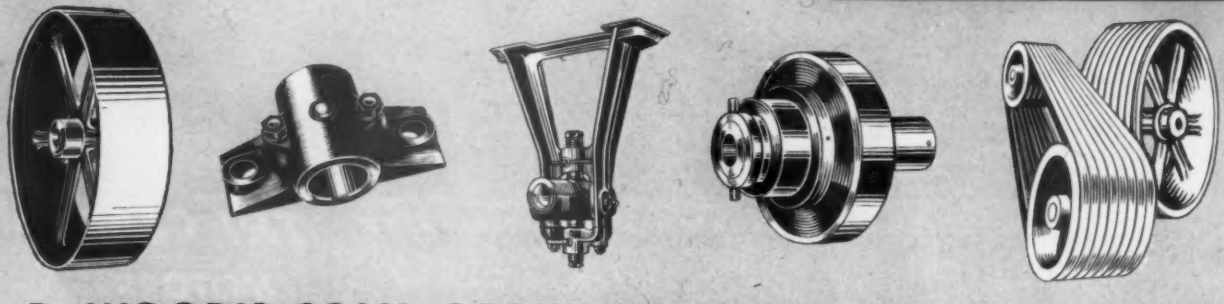
Wood's LONG LIFE LINE

EVERYTHING IN TRANSMISSION

Bearings — Collars — Clutches — Couplings — Contactors — Hangers — Pillow Blocks — Pulleys — V-Belt Sheaves and Complete Drives

MEMBER MULTIPLE V-BELT DRIVE ASS'N

Wood's V-BELT DRIVES



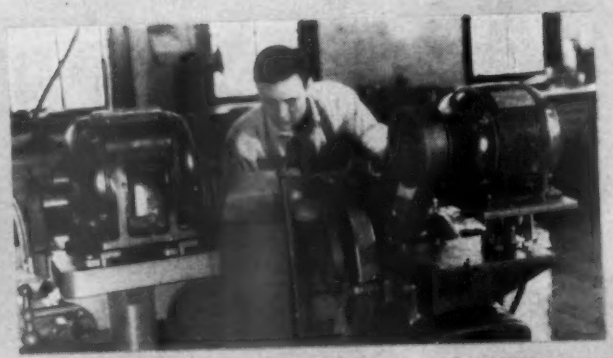
T. B. WOOD'S SONS COMPANY, CHAMBERSBURG, PENNA.

BRANCHES: 387-391 ATLANTIC AVE., BOSTON, MASS. • 83 PLANE ST., NEWARK, N. J. • 425 FIRST AVE., PITTSBURGH, PA.

SHORTS STYMIED

Voltage surges which accompany switching and frequent starting and stopping of motors impose high dielectric stresses on the coil insulation, and can cause harmful short circuits. Yet this is an unavoidable condition of service for many motors.

The grinder shown here, for example, starts and stops every time a finished part is removed and a new part inserted. But the two Tri-Clad motors that drive it have been built to withstand safely the voltage surges ordinarily encountered in this type of service. Their ability to "stymie" shorts was proved by *the new General Electric test* described below.



External grinder, equipped with two Tri-Clad motors, installed in the milk-machinery manufacturing plant of the Rite-Way Products Company, Chicago, Ill.

New high-potential, electronic surge-tester verifies strength of TRI/CLAD motor windings

This electronic test of insulation makes a "cardiogram" of every Tri-Clad motor winding, ferreting out weaknesses that might lead to shorts caused by voltage surges in service. It tests each turn, coil, and phase group of the windings for adequate insulation strength to withstand the "steep front" high-voltage surges of actual service. First developed and applied by G.E., it's one of the production tests which all Tri-Clad motors must pass as they come off our production lines. – *General Electric Company, Schenectady, N. Y.*

GENERAL ELECTRIC

Each week 192,000 G-E employees purchase more than a million dollars' worth of War Bonds.

IT'S A FINE PIECE OF THE PIE

- if your machinery is right!

be Sure it's **Cedarapids** **Built by IOWA**

No matter who you talk to — no matter what combination you use, the figures for the future of construction add up to big ones.

All construction begins with aggregate, and considering that a part of the percentage of the "plant and equipment" figure should be included with "aggregate quarrying," *over* 8% of the highway dollar goes into aggregate production.

Aggregate is basic! Not another machine on the job can turn a wheel until the aggregate is available! Aggregate machinery must be dependable, and must deliver at low cost.

It is machine dependability and high production at low cost that has made Iowa the Headquarters for aggregate producing equipment. Check the names of Iowa owners! Check the output records! Check the number of machines Iowa ships as compared with others! These are the things that prove that big names, big jobs and "Iowa" go together. These are the things that guarantee that Iowa equipment will give you more than you ask on your future contracts.

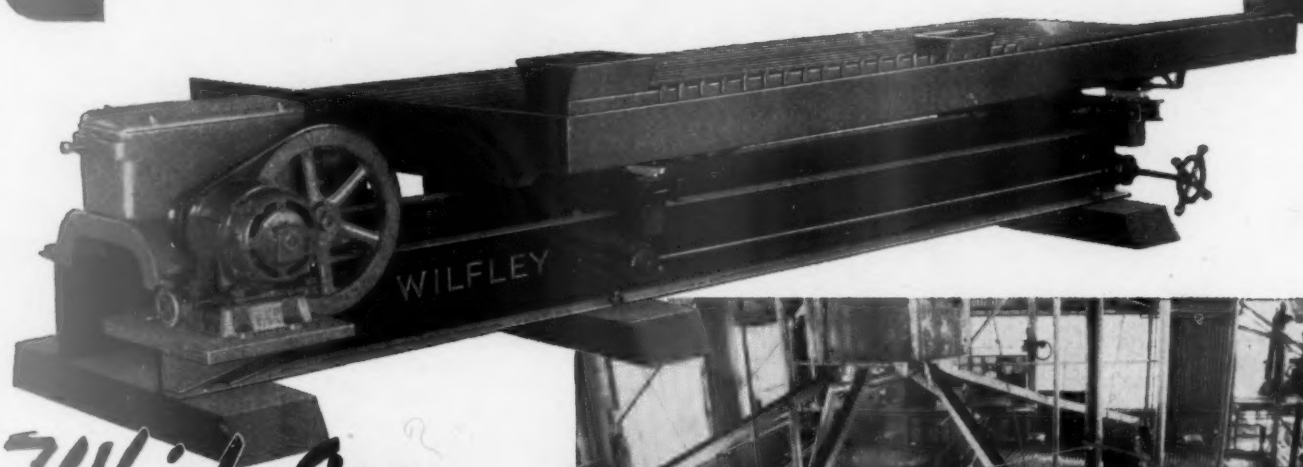
It is a nice piece of pie, and there will be profit in it if you are Iowa-equipped. We'll be glad to help you with your plans.

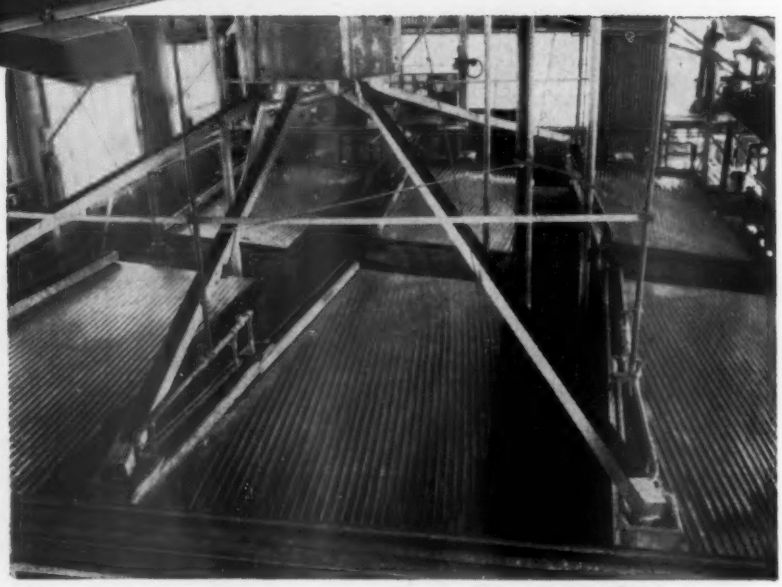
THE IOWA LINE
of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS — STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS — TRAPS
PORTABLE PLACER MACHINES
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

IOWA MANUFACTURING CO., CEDAR RAPIDS, IOWA

Use *Genuine* WILFLEY TABLES for WET GRAVITY CONCENTRATION to get QUICK, LOW COST Recoveries





Which One OF THESE FIVE USES BEST FITS *Your* NEED?

1. For concentrating low grade feeds to produce high grade concentrate for metallurgical treatment and tailings.
2. Before and after flotation for recovery of coarse mineral not readily susceptible to flotation.
3. As pilot tables to check efficiency of each flotation unit, and for recovery where flotation is not satisfactorily high.
4. For two or more separations (or grading up) from flotation concentrates, previous tables concentration, or from original table feed.
5. For concentrating a middlings feed producing a high grade concentrate and middlings for regrinding.

Genuine Wilfley Tables; Massco-McCarthy Hot Millers; Rock Bit Grinders; Belt Feeders; Pinch Valves — LABORATORY EQUIPMENT; MINE & MILL SUPPLIES; COMPLETE MILLING PLANTS.

DENVER
SALT LAKE CITY
EL PASO

NEW YORK CITY

The Mine & Smelter Supply Co.

CANADIAN
VICKERS, LTD.
MONTREAL

W. R. JUDSON
SANTIAGO, LIMA

Nitro Starch Base

High Explosive Efficiency

IN MINING • QUARRYING • LOGGING AND CONSTRUCTION

Plus THREE ADVANTAGES FOR YOU!

WILL NOT PRODUCE HEADACHES from handling . . . reduces discomfort from breathing muck pile fumes. Better working conditions for you and your men!

WILL NOT FREEZE or leak at Arctic or Tropic temperatures. Maintained high efficiency . . . anywhere anytime!

WITHSTANDS IMPACT in high-powered Rifle Bullet Test. Greater safety for workers!

Today Trojan Products are helping our armed forces win through to Victory. We are proud to place our products at the disposal of our fighting men, with the fervent hope that they may help shorten the war . . . if only by a single day . . . so that we may once more utilize *all* our resources for *building* rather than *destroying* . . . so that we may serve America, and you, in the peacetime world "around the corner".

HELP SPEED THE PEACE . . . KEEP BUYING WAR BONDS

EXPLOSIVES 1905 TROJAN 1944 CHEMICALS

POWDER COMPANY

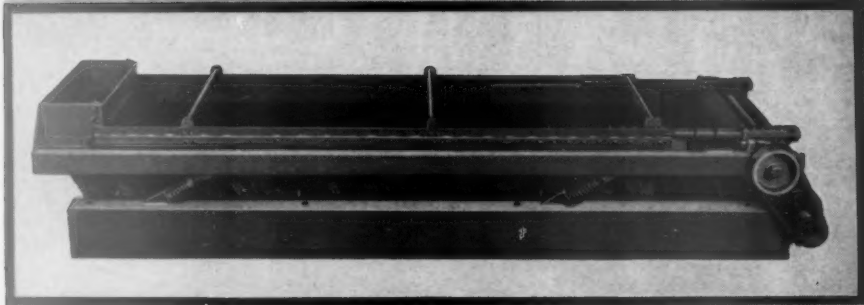
ONE OF AMERICA'S OLDEST HIGH EXPLOSIVES MANUFACTURERS

PLANTS: SEIPLE, PA. • ROBERT, CAL. • MAGAZINES STRATEGICALLY LOCATED THROUGHOUT THE NATION

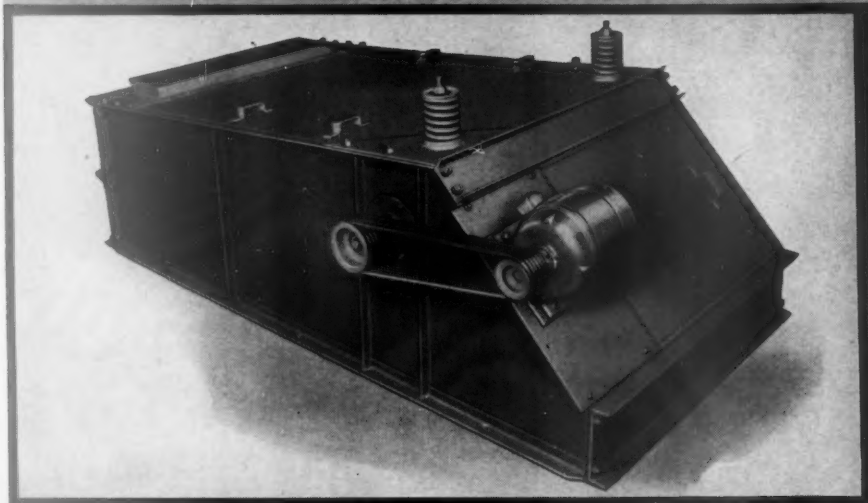
OFFICES: ALLENTOWN, PA. • SAN FRANCISCO, CAL. • LOS ANGELES, CAL. • PORTLAND, ORE. • NEW YORK, N. Y.

FOR ALL SCREENING JOBS

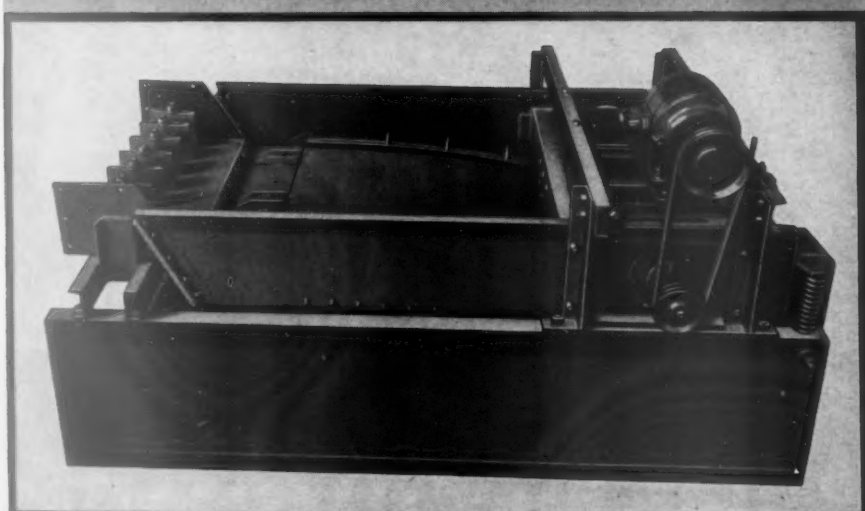
Coal and Metal Mines, Sand and Gravel Plants, Quarries, Paper Mills, Chemical and Industrial Plants



• The Symons Horizontal Screen is recommended wherever extreme accuracy of sizing is desired. Having the lowest headroom of any screen, it is easily adapted to existing plants. *Bulletin 96*



• The Rod Deck Screen is especially applicable for wet, sticky materials difficult to screen. The patented screening surface consisting of spring steel rods has the advantages of big capacity, long life and low maintenance cost. *Bulletin 94*



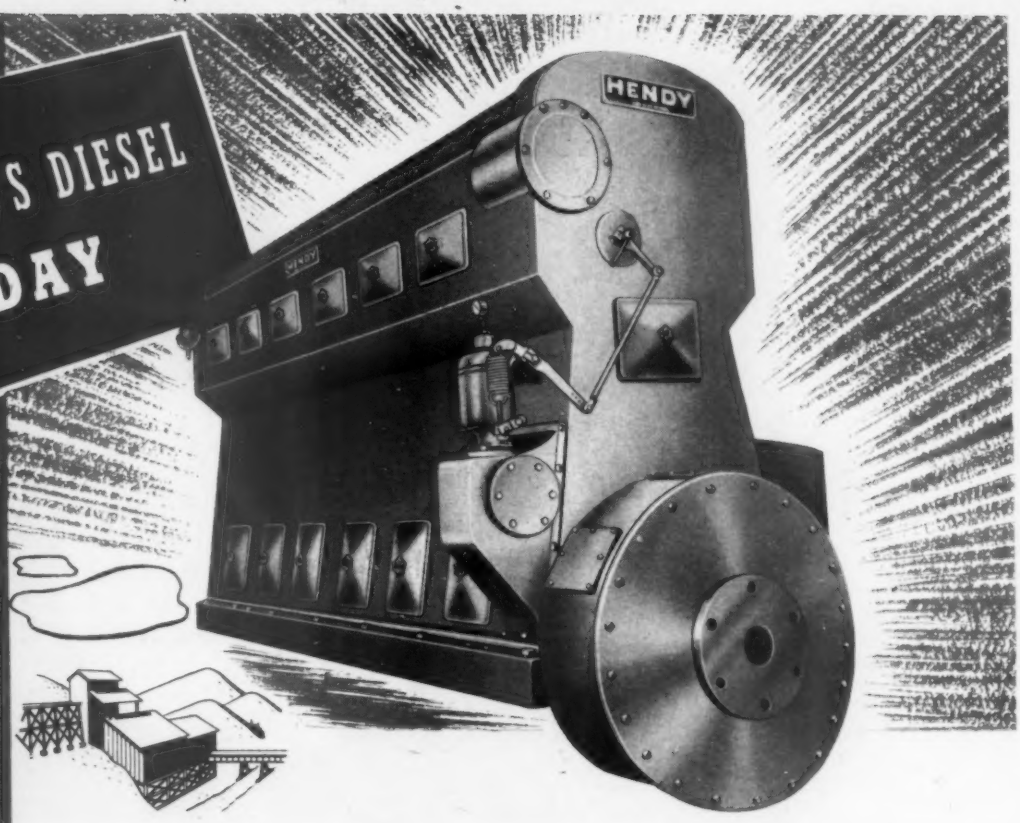
• The Hydro-Sizer Screen has its field in fine wet screening of mine pulps, sand, chemicals and oil well mud and similar fine materials. The screening action is such as to permit of extremely efficient separation with a comparatively dry oversize discharge. *Bulletin 111*

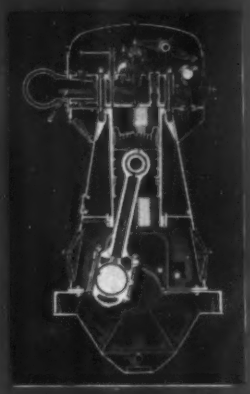
Write for descriptive Bulletins

NORDBERG MFG. CO. • MILWAUKEE 7, WIS.

SYMONS SCREENS

TOMORROW'S DIESEL TODAY





GENERAL SPECIFICATIONS
SERIES 50

Bore—12"; Stroke—15"
Speed—330 to 600 RPM
Rated Power at 450 RPM—
75 hp. per cyl.

Write for complete data on the Hendy Series 50 Diesel Engine

HENDY DIESELS FOR HEAVY SERVICES

Twenty-two valuable design and construction features, never before combined in any single engine, have been incorporated in Hendy Diesels—to lower your operating and maintenance costs and prolong engine life in heavy-duty services for the petroleum industry.

More than a half century of power plant experience is reflected in Series 50 Hendy Diesel Engines... which fully utilize the latest developments in engineering and metallurgical practices.

Among these outstanding features of Hendy Four-Cycle Diesels are:

UNIT TYPE FUEL PUMP AND INJECTORS eliminate long, high-pressure fuel lines and improve engine performance.

DUAL INTAKE AND EXHAUST VALVES are operated by a cross-head which eliminates side thrust from the rocker arms.

OIL-COOLED PISTONS lower piston temperatures, prolong ring and cylinder life, reduce oil consumption.

DESIGN OF WELDED STEEL engine bed and cylinder block assures strength and rigidity... reduces weight.

POSITIVE, AUTOMATIC LUBRICATION throughout engine.

JOSHUA HENDY Division
JOSHUA HENDY IRON WORKS

SUNNYVALE, CALIFORNIA

ESTABLISHED 1856

HENDY

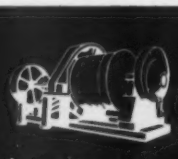
BRANCH OFFICES:

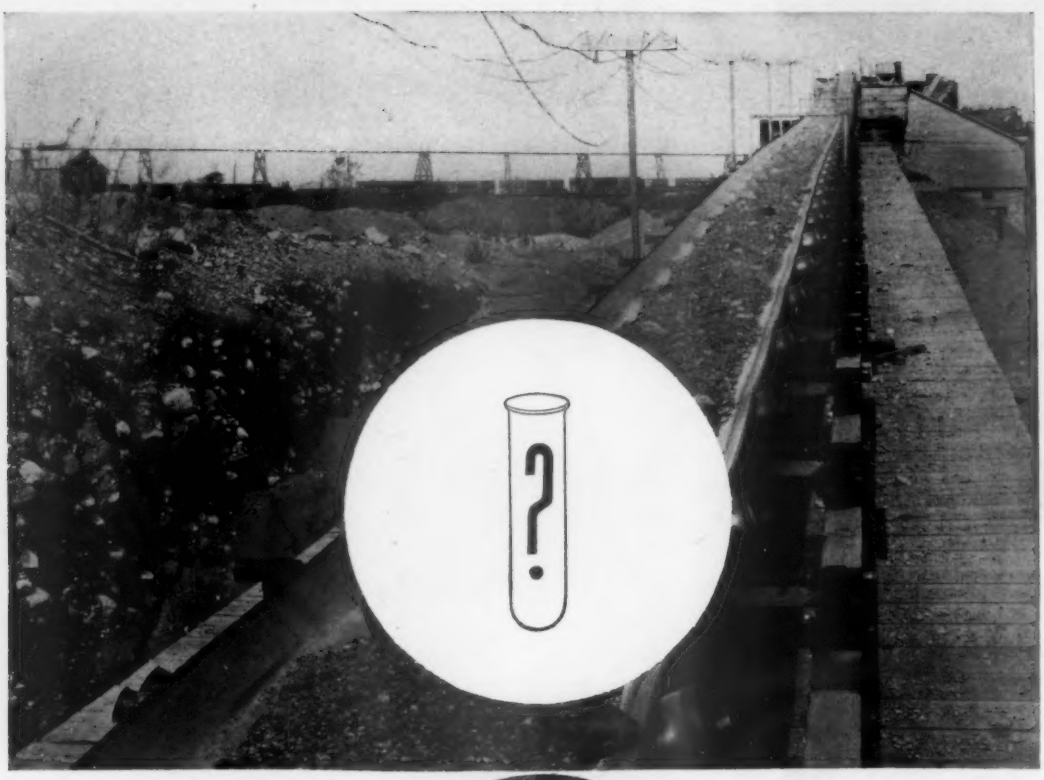
Boston • Buffalo • Chicago • Cincinnati • Cleveland • Detroit • New York • Philadelphia • Pittsburgh • San Francisco • St. Louis • Washington • Los Angeles

HOISTS

MINE CARS

CRUSHERS


BALL MILLS



LABORATORY TESTS SAY *YES*

Prior to Pearl Harbor, when generous quantities of Crude Rubber were available, we knew what service a Quaker Conveyor Belt would give on installations that handled thousands of tons of sand, gravel, crushed stone, cement and kindred materials. Belts of Quaker manufacture were in use in thousands of places under actual working conditions that day after day, month after month, extending to year after year, they were giving service that brought the cost per ton of material conveyed down to the bottom figure.

But, what about Belts from All-American (Synthetic) Rubber?

Gruelling laboratory tests now say: "Yes". Sufficient time has not yet elapsed to get the answer what All-American Rubber Belts will do. We have the utmost confidence that Quaker All-American Belts now in actual use will confirm what the laboratory now tells us.

You can order your Belt today, as well as other Industrial Rubber Products, with complete assurance of receiving finished material that will give you the service you expect.

Quaker Products, made from Crude Rubber or All-American Rubber (Synthetic) are the best the Rubber Manufacturing Industry can offer.

If there is a way to get it done—Quaker will do it.

QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA. • NEW YORK 7 • CLEVELAND 15 • CHICAGO 16 • HOUSTON 1

Western Territory

QUAKER PACIFIC RUBBER COMPANY • SAN FRANCISCO 5 • LOS ANGELES 21

Look Into a Kennedy Reduction Ball Bearing Gearless Crusher

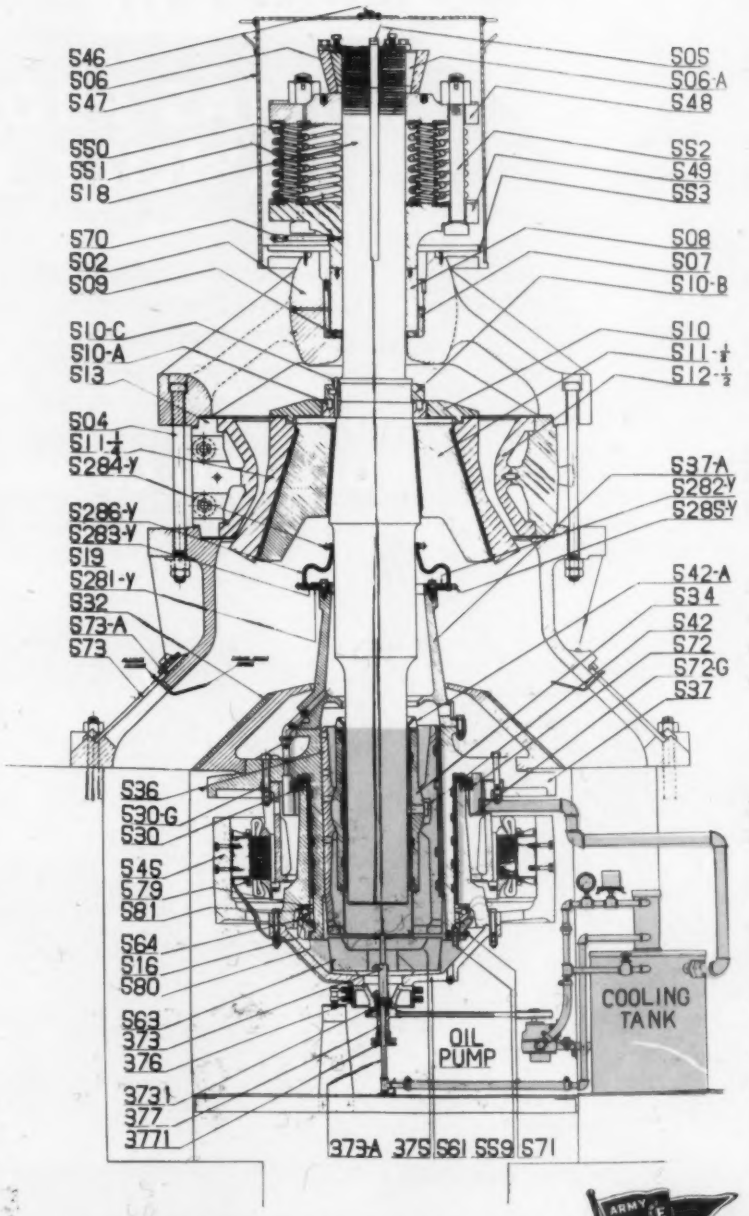
THE CRUSHER WITH THE TROUBLES LEFT OUT

Head and shaft are supported on springs, but the crushing is done against a solid anvil. The movement of the head is such that approximately 29% of the force is downward and, if a piece of steel gets between the head and concaves, it compresses the springs and permits the steel to pass through.

The motor built in the pulley and all of the dead weight are carried on ball bearings which eliminate the troubles of a power-eating rasping bevel gear.

The oil from the pump is forced through the filter and from the filter through the bearing between the shaft and ball. Then it flows downward between the bottom plate sleeve and eccentric, and upward by capillary attraction between the pulley and the bottom plate sleeve to a circumferential tank from which it flows by gravity to the oil cooler. From the tank it is picked up by the V belt driven pump through a gauge recording the pressure. If the pump should fail to send oil through the pressure gauge, then the relay shuts down the crusher which avoids melting out bearings.

This is the last word in crusher design. It takes half the power and produces 25% to 50% more product than can be obtained from an equal size machine of any other make.



SEND FOR BULLETIN "M"

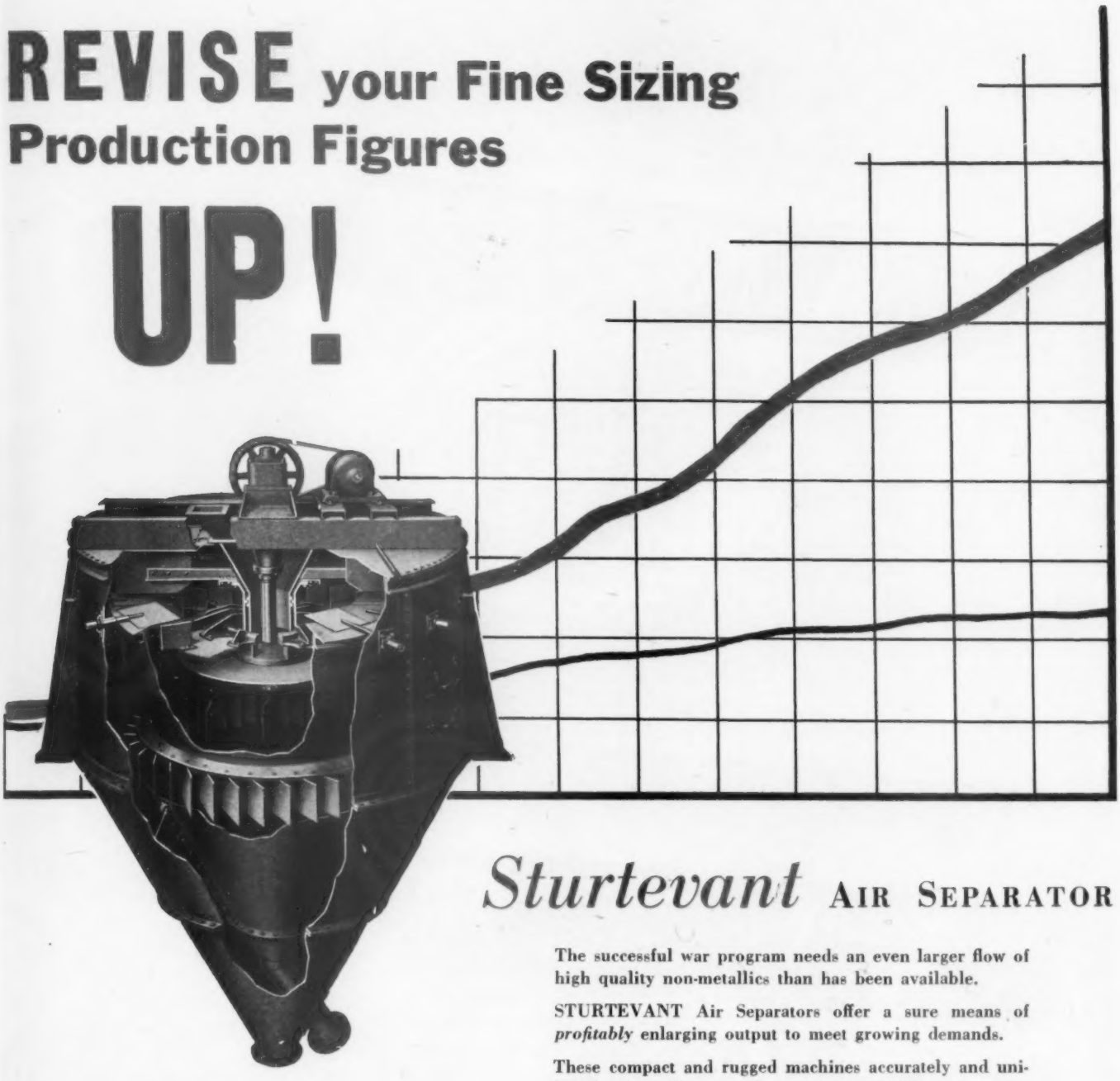
Engineers
Designers
Fabricators

KENNEDY VAN SAUN MFG. & ENG. CORP.
2 PARK AVE., NEW YORK 16, N. Y.

Crushing
Grinding
Calcining

High Speed
DRAGLINE
OPERATION
KOEHRING
. . . HAS PROVEN KOEHRING
ABILITY ON WAR JOBS
Power . . . Speed . . . and Accuracy . . . are the essential requirements in wartime construction and of paramount importance in dragline operation. Koehring Draglines are reliable because they have the potentialities . . . speed . . . power . . . and accuracy . . . all so vital to wartime construction. Adverse working conditions in drainage districts and on defense projects have proven that the Koehring Dragline can be depended upon for essential dragline operation.
KOEHRING COMPANY . . . Milwaukee 10, Wis.
DEPEND ON YOUR KOEHRING DISTRIBUTOR
to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.
KOEHRING
HEAVY DUTY
HEAVY-DUTY CONSTRUCTION EQUIPMENT

REVISE your Fine Sizing Production Figures UP!



Sturtevant AIR SEPARATOR

Cement plants alone have installed hundreds of our Air Separators on approval —and rejected *none*.

Write for Information.

The successful war program needs an even larger flow of high quality non-metallics than has been available.

STURTEVANT Air Separators offer a sure means of *profitably* enlarging output to meet growing demands.

These compact and rugged machines accurately and uniformly size all materials within a 40-350 mesh range, including cement, lime, clay, talc, gypsum, refractories, abrasives, etc.

STURTEVANTS increase output from 25 to 300%, with power saving of 10 to 50%.

They are built in many sizes, with easy adjustments and large feed openings. Capacities from 1 ton to 50 tons per hour.

STURTEVANT MILL CO. HARRISON SQUARE BOSTON 22, MASS.

OPERATE for PROFIT WITH THE..

YORK-KUNTZ AUTOMATIC VERTICAL LIME KILN

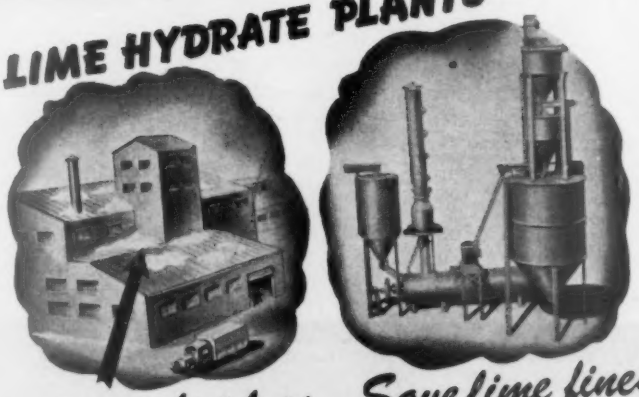
Here's an automatic Lime Kiln that not only eliminates crushing, thereby cutting your overall investment, but also gives you continuous control . . . resulting in a uniform burn that reaches the absolute peak of lime-fuel efficiency known to the industry. What's more, with York-Kuntz you get this automatic operation in a plant taking up less ground space and needing the attendance of only one operator per shift. Provided for either mixed feed, gas or coal firing, York-Kuntz Vertical kilns are the answer to the operator who seeks to increase quality and saleability of his product as well as conserve precious manpower. Added mechanical York-Kuntz advantages are: Continuous Discharge . . . Continuous Feed . . . Adjustable Distribution . . . Center Load Support . . . Center Combustion Control. . . . Write for complete description today.

Eliminates Crusher Plant

AND THE..

KUNTZ GRAVITY SYSTEM OF LIME HYDRATION

LIME HYDRATE PLANTS—



Stop that loss..Save lime fines

Absolute control of the hydration process within one unit . . . less floor space . . . lower first cost . . . that's operation for profit. You save as much as $1.50 per ton because patented dust control stops all loss of lime fines. You can meet more exacting market specifications . . . even in limes having as high as 10% impurities. Kuntz remains today the *only automatic system of one-man operation giving 100% control of quality and uniformity.* Batch or continuous method: can be applied to any type of hydrate plant.

LIME & HYDRATE PLANTS CO.

Associate **McGANN MANUFACTURING COMPANY, INC.** *York, Pa.*

A SYMBOL OF COOPERATION

To the men and women of Thermoid, the Thermoid seal is more than just a trade mark and a product identification. It is a symbol of individual responsibility among all company employes: management, engineering, production and sales.

This concept of the Thermoid seal produces cooperation among employes. Every Thermoid employe realizes that his own business welfare directly depends upon the approval and acceptance of Thermoid Products by the user . . . that men and management who manufacture inferior merchandise also manufacture the elements of their individual failure.

The protection of this Thermoid seal is therefore recognized as the personal duty of every member of the Thermoid group. Uniformity in product manufacture, meticulous inspection, prompt and personalized attention to customers, and all of the other things that have made for consistent Thermoid progress are in large measure traceable to this concept of the Thermoid seal.

No matter what the uncertainties ahead Thermoid will continue to make the finest industrial products possible. 1944 finds Thermoid with the largest personnel and facilities in its history. We are confidently hopeful that during this year, we will have the opportunity of further demonstrating the cooperation symbolized in the Thermoid seal—the cooperation that has caused Thermoid customers to say:—*"It's good business to do business with Thermoid."*

THE THERMOID LINE INCLUDES: Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products • Molded Hard Rubber and Plastic Products.

Thermoid Rubber

DIVISION OF THERMOID CO.
TRENTON, NEW JERSEY

It's Good Business to do Business with Thermoid

Specify RAYMOND MILLS for

In the recovery of magnesium metal from dolomitic limestone, Raymond Equipment is an important factor in the pulverizing, separating and kiln-firing operations.

RAYMOND Whizzer Type Roller Mill

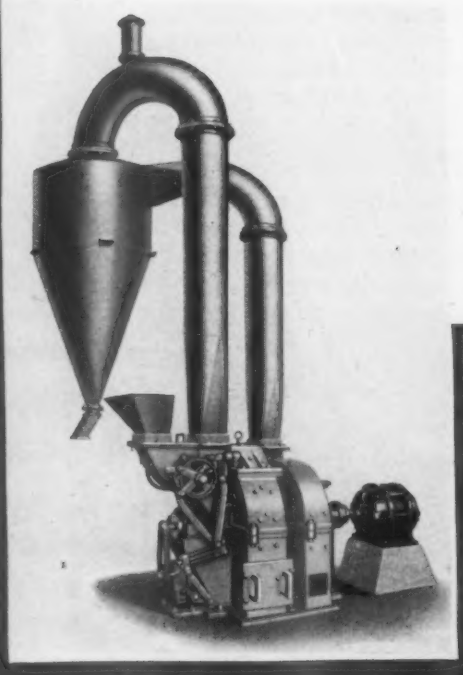
This mill may be equipped with a drying system for removing surface moisture while pulverizing, as in drying and grinding limestone with initial moisture content of about 5%.

GRINDING

Calcined Dolomite

With the **double** whizzer separator, this High Side Roller Mill produces an extremely fine and uniform material and gives easy control of the fineness through the variable speed whizzer. In the usual fineness range from 90% minus 200-mesh to 99.9% minus 200-mesh, extra good capacities are obtainable from 2½ to 5 tons per hour.
Write for Roller Mill Catalog No. 51.

RAYMOND Imp Pulverizer Standard Type



Imp Mills may be equipped with a **flash drying system** for removing high percentages of moisture while grinding.

Raymond Imp Mills are made in seven sizes for such operations as grinding calcined magnesite, light-burned magnesia, and similar materials. Write for Catalog No. 41.

Raymond experience can aid you in selecting equipment for your grinding plants.

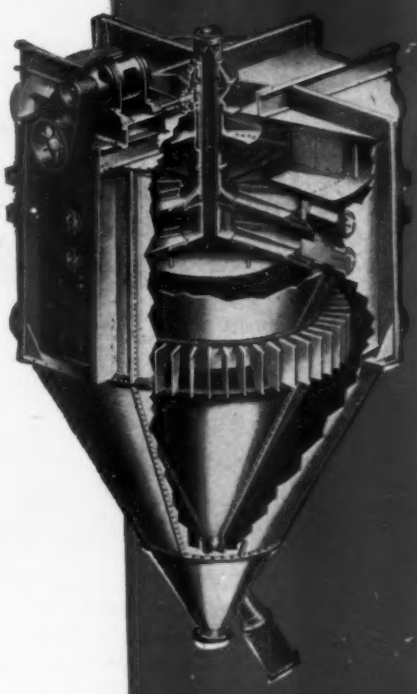
Dolomite Reduction

America's leading plants, engaged in the war-time production of magnesium, are using Raymond Roller Mills, Mechanical Air Separators and Bowl Mills in modern processes.

SEPARATING

Ground Ferro-Silicon
Dolomite Screenings
Hydrated Products

The Raymond **double** whizzer Air Separator is used in closed circuit with grinding mills and it gives superior results, as in classifying ferrosilicon from ball mills, dedusting limestone screenings, or skimming off the fines when taking the product direct from the hydrator.



RAYMOND Mechanical Air Separator

Wide range fineness control is provided by the sliding dampers, adjustable from the outside. Write for Catalog No. 45.

RAYMOND Bowl Mill for Direct-firing

Handles any grade or moisture coal. Complete temperature and operating control system. Write for Catalog No. 43.

Direct-firing Dolomite Kilns

Bowl Mills are the modern direct-firing units for rotary kilns, including the dolomite kilns and the kilns for recovering the magnesium metal, as well as for lime and cement kilns.

RAYMOND PULVERIZER DIVISION

COMBUSTION ENGINEERING COMPANY, INC.

1321 North Branch St... Chicago 22, Illinois

Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal

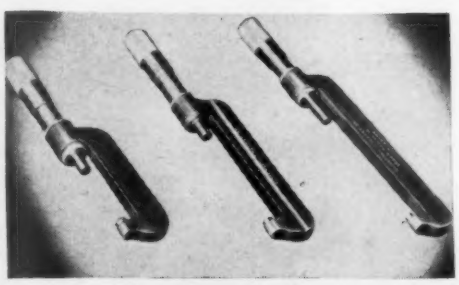
SINCE 1887

Top: 822-Q "Two Unit" Quarry Plant.
293-Q Quarry Plant.
Bottom: 880 Senior Dual Crusher Gravel Plant.
285-W Gravel Washing, Screening and Crushing Plant.

CRUSHED rock and gravel—in tremendous volume—is essential ammunition in the present war. Roads must be built in days instead of months, and concrete structures must literally spring from the ground. The speed with which this work is done is a typical case of American-built equipment giving important advantages over the enemy.

On every front, Universal crushing plants and rock and gravel crushers have speeded up the work. On the Alaska Highway, on South Pacific islands and elsewhere, they have established production records and functioned faithfully with minimum maintenance, so important in emergency construction. On the home front, Universal crushing equipment has done its share in the rapid building of access roads, runways and other military installations.

Universal is also producing pulverizers for fertilizer and explosives plants, and we are making a direct contribution to the war effort in the production of army ordnance equipment which we have been called upon to build. At right are gages made in our toolroom for use in producing precision parts in our shops.



UNIVERSAL ENGINEERING CORP.

619 C Avenue W., Cedar Rapids, Iowa

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

That more planes may fly

Today, endless caravans of giant trucks are rolling night and day all over the face of America . . . all dedicated to but one proposition: That more planes may fly . . . that more ships may come down the ways . . . that a nation may have everything it needs to fight—*and win!*

To perform this essential job . . . to make sure that it will be done in the minimum time and with the minimum cost in equipment, manpower and precious fuel stores . . . the country's biggest operators are using the power that, for more than a decade, has been setting the pace in economy, speed and dependability—*Cummins Diesel Power.*

So marked has been this trend to Cummins in the motor transport field that 90% of all long-line, heavy-duty, diesel-driven trucks are now Cummins-powered. Here is ample proof that major fleet owners have learned that the surest way to "get there fustest with the mostest" is to power with Cummins Dependable Diesels. CUMMINS ENGINE COMPANY, Columbus, Indiana.

This is the fifth in a series of advertisements depicting the war-time role of Cummins Diesel Power in the nation's basic industries. If you are operating Cummins Diesels on your job, make doubly sure of their most efficient use by providing for their proper maintenance and service. Ask your Cummins Dealer for details.

Old "Forty Per Cent" Has Been a Good Handyman...

But..

For years, many a blaster has depended on "Old Forty Per Cent" dynamite for the job, regardless of conditions involved—with the old reliable handy, no need to monkey with new-fangled dynamite. "Old Forty Per Cent" has turned in a reasonably satisfactory performance, too.

But like all handymen, "Old Forty Per Cent" does not always measure up to the job. Special conditions call for special qualities that the old handyman dynamite does not possess. The blaster needs the right explosive and the right method to do the job right.

*Synergism—*a growing habit in American industry. Men bring problems and ideas together so that minds "click" to produce a result far greater than the sum of ideas expressed. So to speak, they make 2 plus 2 equal 5.

After all, explosives are tools of production. As in any precision operation, the right tool must be used in the right way to achieve the best results. Blasters are learning that blind dependence on "Old Forty Per Cent" is not necessarily the way either to get the best blasting result or the lowest costs of operation.

To insure the right explosive for the job, Atlas provides more than one-hundred and twenty grades and types of explosives in over 300 sizes to choose from. And Atlas representatives always are ready to apply synergistic* thinking to your blasting problems to produce better results at lower costs. Consult us.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

HOW LeTOURNEAU EQUIPMENT AFFORDS YOU

More Uses FOR YOUR TRACTOR POWER

You can stretch your tractor's usefulness from one profitable materials-handling job to another with the flexible LeTourneau Dozer - Rooter - Carryall Scraper method.

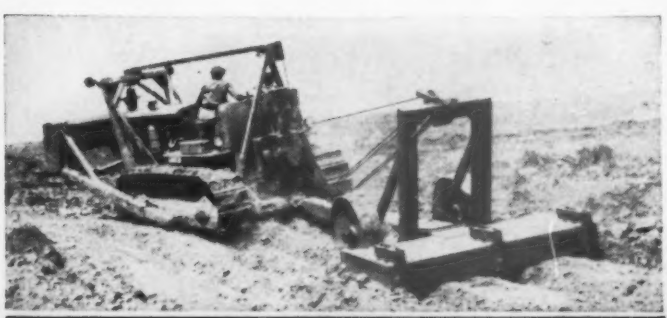
Here's How

The same tractor used to clear land and build roads with LeTourneau Dozer, will load, haul and spread big yardages of overburden with a Carryall Scraper . . . or can be hooked up to a rugged LeTourneau Rooter to break up hard, rocky material for fast, low-cost stripping. But that's not all . . .

Use Same Tractor for Heavy Lifting

With your regular earthmoving tractor, you can use a LeTourneau Tractor Crane to lift and move heavy machinery, erect structural forms, etc. All four tools —Dozer, Carryall, Rooter and Crane—are quickly and easily interchangeable. All operate by cable from the same standard LeTourneau 2-drum Power Unit and tractor . . . thus, give you a wider range of tractor usefulness and lower-cost handling on all these pit and quarry jobs.

Pictures here show how other successful companies put this money-saving equipment to work. Your local LeTourneau dealer will gladly help you plan for similar savings on your stripping and materials-handling jobs. Call on him NOW.



DIGGING DIVERSION CANAL to insure continuous mining operations. Amalgamated Tin Mines of Nigeria, Ltd., used this LeTourneau Rooter to break up tough laterite for faster, easier excavation with Angledozer and Carryall Scraper. All three tools were interchanged to do the job with this one tractor and LeTourneau Power Unit.

STRIPPING OVERBURDEN from mica deposits in Brazil. This LeTourneau Carryall (15 heaped yards) loads, hauls and spreads in continuous operating cycles. In most places, depending on economical length of haul, Carryalls carry and waste their loads far enough from the pit to eliminate future rehandling.

UNLOADING SHOVEL PARTS on an isolated job, near San Felix, Venezuela, this LeTourneau 30-foot Tractor Crane paid for itself in the first 3 days' operation, its owner estimated. Only LeTourneau gives you a lifting tool to work from the same Power Unit and tractor that operate Dozers, Rooters and Carryall Scrapers.

MOVING PILES FROM STACKER at washing plant. Cooley Brothers, Webb City, Missouri, open-pit operators also use this LeTourneau Angledozer and "Caterpillar" D8 tractor to strip pockets which would be too costly to recover with big shovels and draglines.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*.

*Trade Mark Reg. U. S. Pat. Off.

WHY Form-Set Purple Strand is still hard to get

No need to tell wire rope users that wire rope is hard to get.

You've been telling *us!*

But perhaps you'd like to know why, when consumers of some other products are looking toward easing of restrictions, wire rope is still tight. Here are some of the reasons:

The shipbuilding program, with its emphasis on landing craft, will continue to make heavy inroads on wire-rope production. And so, of course, will the year's stepped-up military and naval operations. Further, the country's 1944 oil program contemplates an increase of from 18,000 to 24,000 wells — and for wells so much deeper than ever before that oil-country demands for wire rope will leap upward from 80 to 100%.

We therefore make this suggestion: Figure your wire rope needs (and place your orders) as far in advance as possible. This offers the best assurance that the wire rope you are going to need through the year will be on hand when you need it.

And while you're thinking about wire rope, think of Form-Set Purple Strand.

★ ★ BETHLEHEM STEEL ★ ★

"Purple Strand" means that the rope is made of "Improved Plow" steel, the strongest, toughest steel used in wire-rope manufacture.

"Form-Set" means that the wire rope is preformed, making it not only rugged but far easier to handle. Preformed wire rope gives longer service because it is much better able to stand bending fatigue.

Form-Set Purple Strand is Bethlehem's top-quality wire rope. It is made in all sizes and constructions. For the utmost in flexibility and ruggedness, and long service life, call for Form-Set Purple Strand.

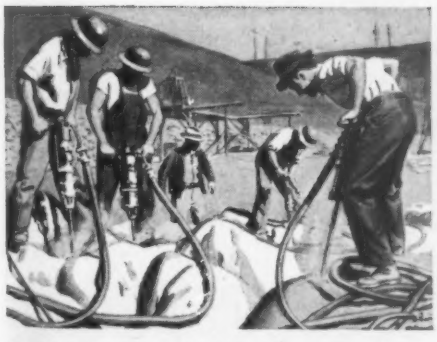
Mechanical Giants
—with muscles of oil

Seabees and Army Engineers are putting bulldozers to work under conditions and on jobs nobody ever thought a machine could handle before the war. They whack out roads in dense Pacific jungles. Level landslides in Italy. Build landing fields on barren Aleutian Islands. Even wipe out Jap pillboxes with these mechanical giants.

Earthmoving parts of bulldozers... like the working parts of so many modern machines ...are operated hydraulically. They get their power through relatively slender hose that must be scientifically designed and built to withstand tremendous pressures, extreme changes of temperatures and to be able to flex without excess strain.

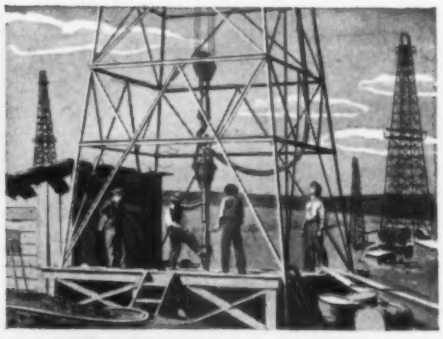
Scientific design is equally true of air hose, drilling hose, oil and gas hose...scores of different types of hose manufactured by United States Rubber Company. Many of them...like the hydraulic hose in bulldozers . . . are being subjected to new and unexpected strains and punishment in their wartime jobs. United States Rubber Company scientists are putting all their skill and ingenuity into improving the stamina and quality of U. S. Rubber Hose. The knowledge they are gaining now will be put to good use in peacetime applications.

SERVING THROUGH SCIENCE



HOSE, specially engineered to handle extremely high pressures, furnishes the power for air-hammers and compressed air drills in mines and quarries the nation over.

"BOMBS AWAY" ... and on target ... mean that hydraulic machines have once again operated smoothly and efficiently. Bomb-bay doors and landing gear are only two of many places in fighting planes where hose is on the job.



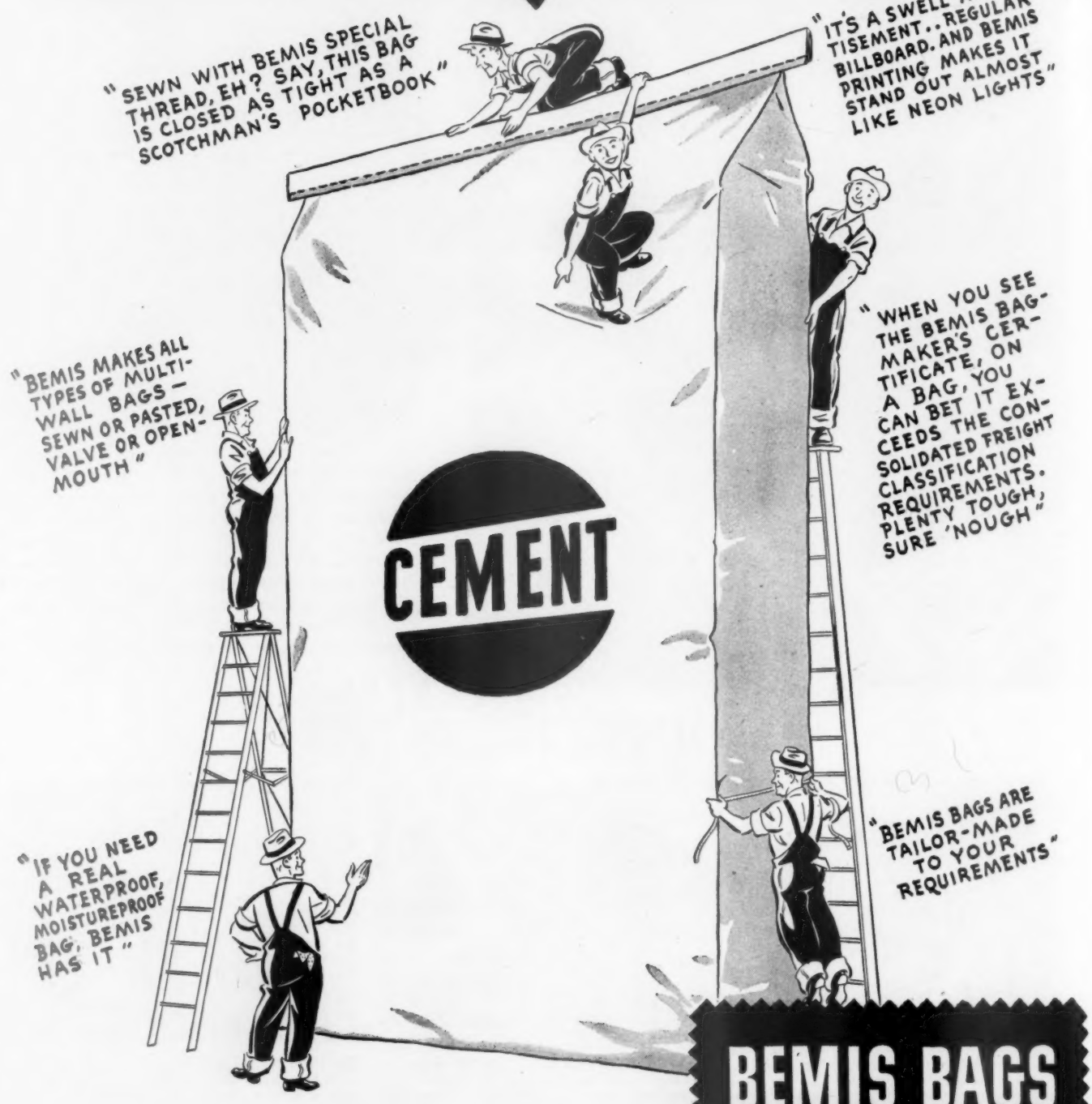
DRILLING HOSE, suction and discharge hose help keep vital petroleum flowing to the Armed Forces and to industry. Here again, hose must be scientifically designed, specially made for a specific task.

Listen to the Philharmonic Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

Bemis MULTIWALL PAPER SHIPPING BAGS . . .


"SEWN WITH BEMIS SPECIAL THREAD, EH? SAY, THIS BAG IS CLOSED AS TIGHT AS A SCOTCHMAN'S POCKETBOOK"
"IT'S A SWELL ADVERTISEMENT.. REGULAR BILLBOARD. AND BEMIS PRINTING MAKES IT STAND OUT ALMOST LIKE NEON LIGHTS"
"BEMIS MAKES ALL TYPES OF MULTI-WALL BAGS — SEWN OR PASTED, VALVE OR OPEN-MOUTH"
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"WHEN YOU SEE THE BEMIS BAG-MAKER'S CERTIFICATE, ON A BAG, YOU CAN BET IT EXCEEDS THE CONSOLIDATED FREIGHT CLASSIFICATION REQUIREMENTS. PLENTY TOUGH, SURE 'NOUGH"
"IF YOU NEED A REAL WATERPROOF, MOISTUREPROOF BAG, BEMIS HAS IT"
"BEMIS BAGS ARE TAILOR-MADE TO YOUR REQUIREMENTS"

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500 Feet of Air on Wheels

Hundreds in world-wide use have proved the smoothness, economy and sturdiness of CP's 500-ft. Diesel-driven portable air compressor. Its exceptional smoothness is the result of the fine, inherent balance of the true V-8 arrangement of the compressor cylinders, and the use of a 6-cylinder engine. The compressor is of the two-stage, air-cooled type; the engine is the Caterpillar D-13000 Diesel.

Incorporated also are the well-known CP features: gradual speed regulation . . . Simplate Valves...pressure lubrication...self-adjusting clutch . . . spring suspension and automotive steering. CP Portable Compressors are available also in sizes of 60 to 315 c.f.m. gasoline or Diesel powered. Write for complete data.

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PNEUMATIC TOOLS
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CHICAGO PNEUMATIC
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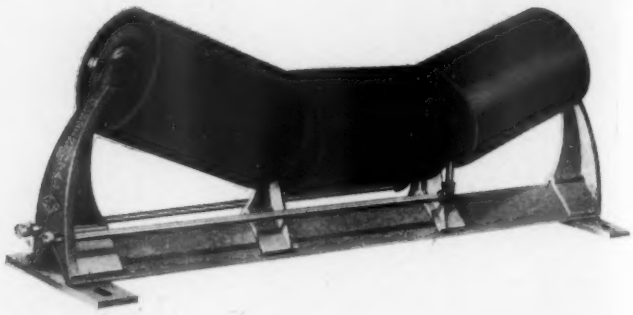
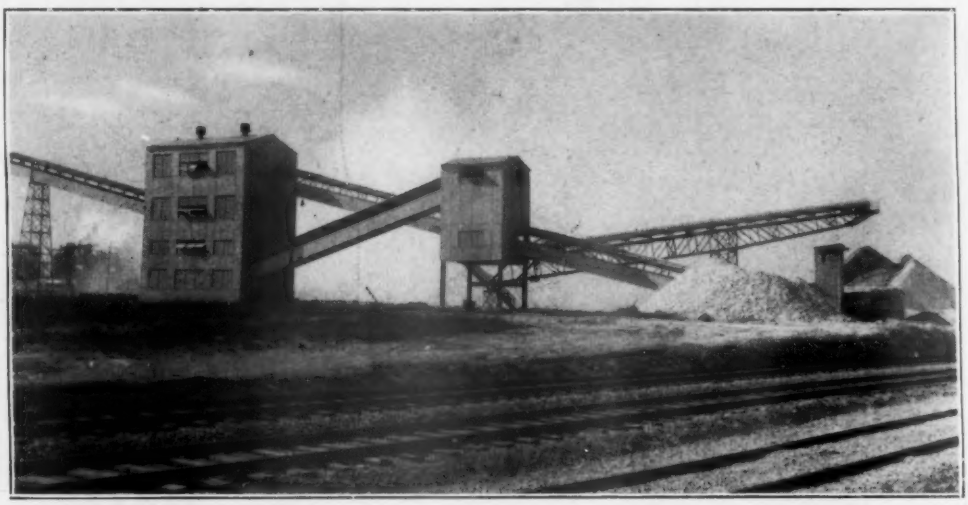
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

Continental
IDLERS
on the job at



International Minerals and Chemical Corp.



Plant of International Minerals and Chemical Corporation, Austin, Texas.

FOR THE WAR EFFORT

ARMY E NAVY

★ ★ ★ ★

Pennant awarded October, 1941
1st **renewal** (Star) May, 1942
2nd **renewal** (Star) October, 1942
3rd **renewal** (Star) April, 1943
4th **renewal** (Star) December, 1943

Continental Conveyors, some of which are illustrated above, are daily handling materials—lumps to fines—from track hoppers to scalping screens; from primary and secondary crushers to transfer tower; from transfer tower to storage pile and from scalping screen in crusher building to sizing screen in kiln building. Not illustrated are track hoppers, apron feeders and conveyors from sizing screens to bins in kiln buildings at this modern plant of International Minerals and Chemical Corporation.

As engineers and manufacturers of modern Conveying, Elevating and Mechanical Power Transmission Equipment, Continental welcomes an opportunity of serving you on similar problems.

Whether you require complete installations or repairs and replacements, specify CONTINENTAL.

For engineering data on belt conveyor equipment installations, write for a copy of our bulletin ID-105.

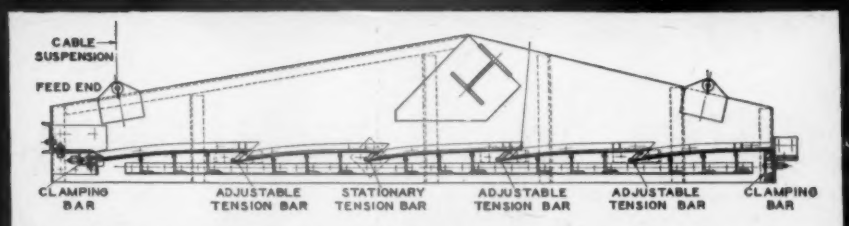
INDUSTRIAL DIVISION

CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

CGC ATLANTA • DALLAS • MEMPHIS CGC

PRODUCT OF THE MONTH



NEW END-TENSION DECK design of Allis-Chalmers' Low-Head Vibrating Screen employs a feed distributing plate and a series of longitudinally crowned screen surfaces with flat transverse sections. This construction assures uniform depth of product; maximum screen surface utilization. Screen surfaces reversible.

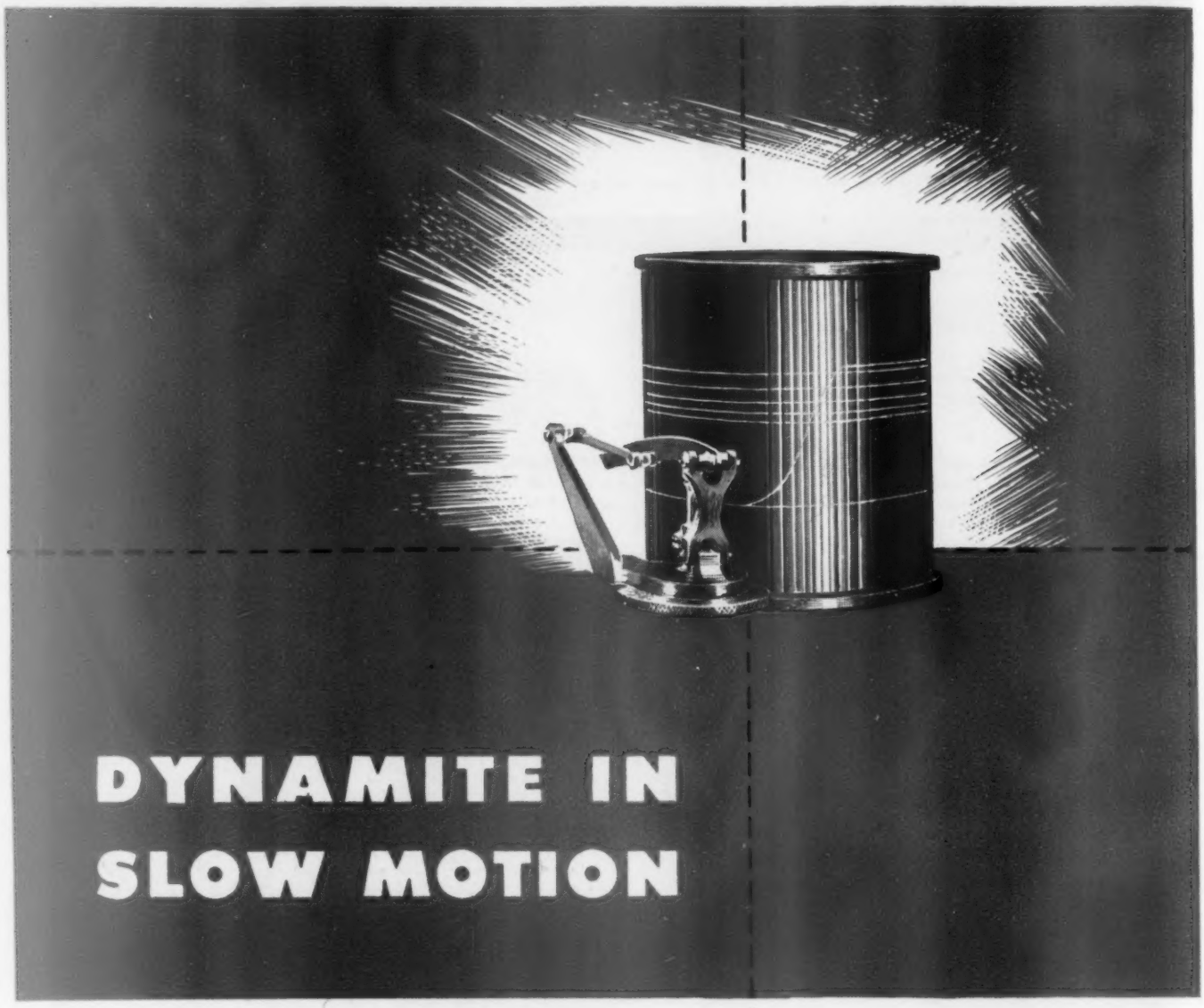
5 by 16 ft. Low-Head Screen with End-Tension Deck to be used as primary screen in Sink-Float plant.

MILWAUKEE, WIS.—Allis-Chalmers announces Low-Head Vibrating Screen with new End-Tension Deck developed for wet screening and dewatering. Rubber-covered screen surface supports serve as independent drip strips — assure efficient dewatering operation. Send for Bulletin B-6321. A 1714

WE WORK FOR VICTORY — WE PLAN FOR PEACE

ALLIS-CHALMERS ... AUKEE · WISCONSIN

♪ Tune in the Boston Symphony, Blue ... Network, Saturday at 8:30 pm, EWT.



DYNAMITE IN SLOW MOTION

TRANSLATING THE DETONATION of an explosive into a continuous line . . . and thus charting the exact rate at which pressure is developed is one of the tasks of the recording device pictured above. In effect, it produces a slow-motion picture of an explosion so that its characteristics may be accurately observed.

Through apparatus such as this in one of the most modern laboratories, Hercules technicians study the behavior of explosives of almost every type . . . and thus add to their background of knowledge. It is this wealth of experience—in research, in the field, and in manufacturing—that maintains a constant vigilance over the quality of Hercules explosives, for your benefit and ours.

HERCULES EXPLOSIVES

HERCULES POWDER COMPANY
INCORPORATED
960 King Street
Wilmington 99 . . . Delaware

Model ME-650 Murphy Diesel 200 Horsepower, 6-cylinder, supercharged engine, powering a Davenport-Besler locomotive.

Here's *Power* to Pull Your Load . . .

MURPHY-DIESELS

WHATEVER your load . . . wherever work calls for heavy-duty power . . . *Murphy Diesels* "take it in stride". . . they tackle the toughest jobs with assurance of *More Power, More Profit.*

These modern Diesels fit your job . . . their compactness, relatively light weight, portability and dependable power can be relied upon, day-in and day-out. They start easily . . . premium-priced fuels are not needed . . . operating costs are low . . . No unnecessary shut-downs for maintenance . . . simple to operate, and require no specialist to keep them on the job. Their ruggedness gives them longer work-life . . . on either long, continuous operation or intermittent peak-loads, they are equally "willing and able". Write for bulletin.

ARMY-E-NAVY

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MURPHY DIESEL

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More Profit

MURPHY DIESEL COMPANY
5307 West Burnham Street
Milwaukee 14, Wis., U.S.A.

Engines: FROM 90 to 215 HP
Generators: FROM 60 to 115 KW

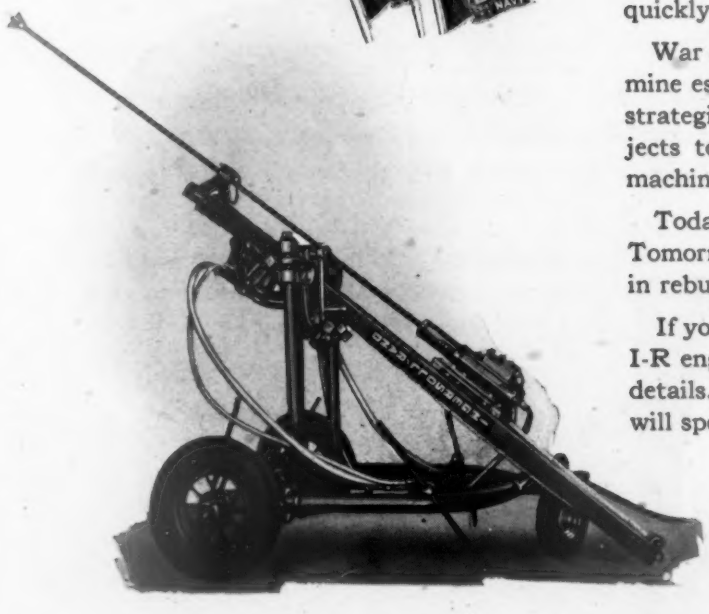
"FIELD-PROVEN POWER"

No this isn't a secret type of anti-aircraft gun. It is an FM-2 wagon-mounted rock drill designed especially for deep hole drilling. It is unusually flexible, can be moved from hole to hole quickly and can be set up so as to drill holes at any angle.

War could not be waged without rock drills, since they help mine essential ores, build landing fields for planes, construct strategic highways and help build giant hydroelectric projects to supply the power that keeps our war production machines rolling at an ever increasing tempo.

Today rock drills are helping us win the fight for freedom. Tomorrow when peace arrives, they will be just as useful in rebuilding the war-torn nations of the world.

If you have a problem which requires deep hole drilling, the I-R engineering service division nearest you can supply full details. And our engineers can also show you how Jackbits will speed up your job.



Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

5-367

COMPRESSORS • TURBO BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS • CENTRIFUGAL PUMPS

"Little out-of-the-way things often serve large purposes"★

"Thomas Robins was the pioneer of conveyor-belts . . . (He) revolutionized the conveyor-belt design . . . He developed the idea of idler pulleys and the troughed-shape belt... This idea was the best fundamental conception of a conveyor-belt"

★

WHEN THOMAS ROBINS introduced the rubber-covered, trough-shaped Conveyor Belt in 1891, it proved to be the opening of a new industrial era. Before the Belt Conveyor, quantities of raw materials—in mines, quarries, gas and cement plants—were handled in hundreds of tons per day. But with this invention, plants were erected which produced thousands of tons per hour.

When it was cumbersome and costly to handle materials, only the highest grade ores were mined. With the advent of the Belt Conveyor, it became possible and economical to utilize the low grade ores as well. Other minerals and materials which could not be handled by any other means became useful additions to the industrial economy.

With the Belt Conveyor, a single plant produces 1,000,000 tons of washed and sized limestone a month; a coke plant stores and handles 1,000 tons of coal an hour; a shipping pier unloads 6,000 tons an hour; a collier puts ashore her 10,000 ton cargo in five hours with only three attendants—and no shore-based equipment.

Without the Belt Conveyor, mass production might never have been achieved. Without Robins and its pioneering ingenuity—which created 41 "firsts" in a single decade—many materials handling problems might still remain unsolved. Solving difficult materials handling problems has been a Robins habit for half a century. Perhaps you face one now. Submit the facts to Dept. PQ3 for an impartial, non-obligating analysis.

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ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS CONVEYORS INCORPORATED

Founded in 1896 as Robins Conveying Belt Co.

PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

ROBINS *makes:* BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . It's **ROBINS**

How a bad connection led to a good one

Every time I see pictures of those Jeeps bouncing across the country I'm reminded of the ride I took with Samson in his old Model T. It was back in '15: Samson was Super at a cement quarry in Illinois, and I was busy with Cordeau-Bickford, the original detonating fuse. He had

I went along the trunk line

wired me to drop everything and come out. ". . . and bring a union," were his closing words.

We were hitting the back road — hitting the high spots, fast! "What's the hurry?" I gasped.

"I got a hill full of dynamite an' a brand new shovel eatin' her head off," he replied. "We have about 30 feet of good cement rock along here," he added, as we slid to a stop, "but we can't keep ahead of the shovel with just one row, so I decided to sink some more holes. Finished loading night before last — our first Cordeau hook-up. We shot yesterday, and the only thing it did was blow up the cap!"

From where we stood I could see a network of Cordeau: a double row of holes with slit-wrap connections at each hole. I went along the trunk line, making sure that the branch line connections were tight and led off at right angles to the trunk. When I came to the end of the line nearest the face I noticed that it was fused and blackened, so I cut the end off square and clean.

Samson handed me an electric cap and I connected it onto the end of the trunk line with our Special Union — I always took some along when I went on these trips. Then, while he moved the car I ran the wires over the hill to the battery. When all was ready we set off as pretty a blast as you ever saw.

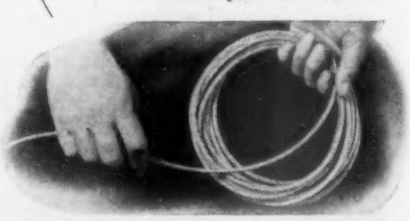
"Let's see one of those unions!" said Samson later, as the train was pulling into the station. ". . . Yeah . . . I guess laying the cap and Cordeau cross-wise under a rock wasn't such a hot idea! . . . It generally pays to follow the manufacturer's recommendation.

"Well, so long . . . and thanks for the union — *and the check-up!*" he added with a grin, as I swung aboard.

Don't Use Make-Shift Methods! Follow Approved Practices.

Primacord replaced Cordeau in 1938. It, too, requires the proper placing of the cap but the old slit-wrap is replaced by a simple slip knot, *drawn tight* at each branch line.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut



7

PRIMACORD·BICKFORD
Detonating Fuse
Also Makers of Ensign-Bickford Safety Fuse — since 1836

LONG LIFE

BUDA ~~Low Pressure~~ DIESEL

The smooth, steady flow of power from a BUDA "Low Pressure" Diesel means more than just good torque characteristics and peak performance . . . it means *longer life* as well. Cushioning the crushing impact of high-pressure combustion, changing the shock of a sharp explosion into a long, smooth power stroke, BUDA Low Pressure design adds years to the life of connecting rods — crankshaft bearings and other engine parts.

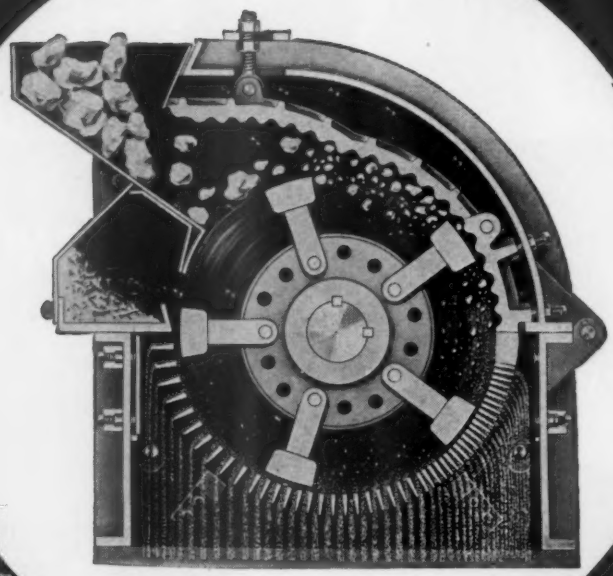
ORDINARY DIESELS
. . . High cylinder pressures produce sledge-hammer blows that punish pistons rods and crankshaft every power stroke.

BUDA Low-Pressure DIESELS
Prolonged "low pressure" combustion delivers a smooth, steady power stroke that cuts vibration, saves parts.

BUDA

HARVEY (Chicago Suburb) ILLINOIS

It's the DIAMOND HEAVY DUTY HIGH TONNAGE *Self-Cleaning*



HAMMERMILL

Put this DIAMOND Hammermill up against your toughest jobs — compare it with any other hammermill you have ever used — and we're willing to abide by your verdict.

THE "CONTINUOUS IMPACT" principle of the DIAMOND Hammermill is obtained by the design of the top feed opening. All material as it is fed is engaged at once by the fast revolving hammers and repeatedly crushed against the extra long corrugated anvil. The result is extremely fast and uniform reduction.

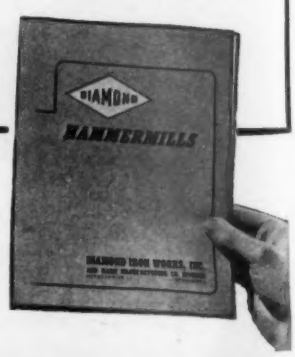
THE "SELF CLEANING" feature saves 2 or 3 hours' time if for any reason there is a power stoppage with feed continuing. The grates are mounted on a cam and can quickly be lowered from the outside (without opening cover) and the extra clearance permits centrifugal force to clean the machine in a few minutes.

DIAMOND ENGINEERS will gladly consult with you as to type and size of mill and production arrangement best suited for any material you need to reduce.

WIRE, PHONE or WRITE for Bulletin No. D-44-L on DIAMOND Hammermills or contact any DIAMOND Dealer.

Look at This List of Features---

- Extra long adjustable anvil.
- Continuous crushing impact.
- Oversize balanced rotor shaft.
- Discs double keyed to shaft.
- Extra take-up holes for wear.
- Adjustable hammer arms.
- Interchangeable hammers.
- Hardened hammer retaining pins.
- Grates and anvil adjustable from outside.
- Self-cleaning feature.
- Structural steel, electric welded throughout.
- Accessible design.
- Heavy duty shock load roller bearings.
- Trap for uncrushable material.



DIAMOND IRON WORKS, INC.
ESTABLISHED 1880
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Land of inventive genius and productive skill and business enterprise. This is America! ★ As one of America's basic industries, Raybestos has kept pace with American progress . . . achieving leadership in the production of advanced brake linings and clutch facings for the four great fields — Automotive, Heavy Duty, Industrial and Aircraft. ★ Today, out of this leadership and the rigorous proving ground of war production, are coming for you — and will continue to come — Raybestos friction materials exemplifying that progressiveness which says, "This is America! This is Raybestos"!

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Raybestos

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BEAT 'EM WITH BONDS

DRILL *in any position and at any angle*

Pneumatic tires are now unobtainable except for armed forces; DR30 Wagon Drills are regularly supplied with steel wheels only.

with the

CLEVELAND DR30

★ By merely loosening two nuts, the Cleveland DR30 Wagon Drill can be swung forward or back and from side to side. Then set it as you wish—straight down, flat, breast high, higher than your head, within 4" of ground level, or even straight up. • Here are a few more important features of the DR30:

- ★ **Feed capacity over 8 feet, handles depths to over 25 feet.**
- ★ **Recoil device holds machine to its work, increases drilling speed 10-25%.**
- ★ **Forward leg point holds the drill and steel in line on all kinds of holes.**
- ★ **Centralizer keeps steel from "walking" when starting hole, prevents breakage of bit points.**
- ★ **Twin jack-screw mechanism permits easy moving of U-bar, shortens set-up time.**
- ★ **Main wheels swivel 90° for line drilling, and 180° to obtain narrower tread.**

Write for Bulletin 132 that fully describes the most popular wagon drill ever built.

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Division of The Cleveland Pneumatic Tool Company

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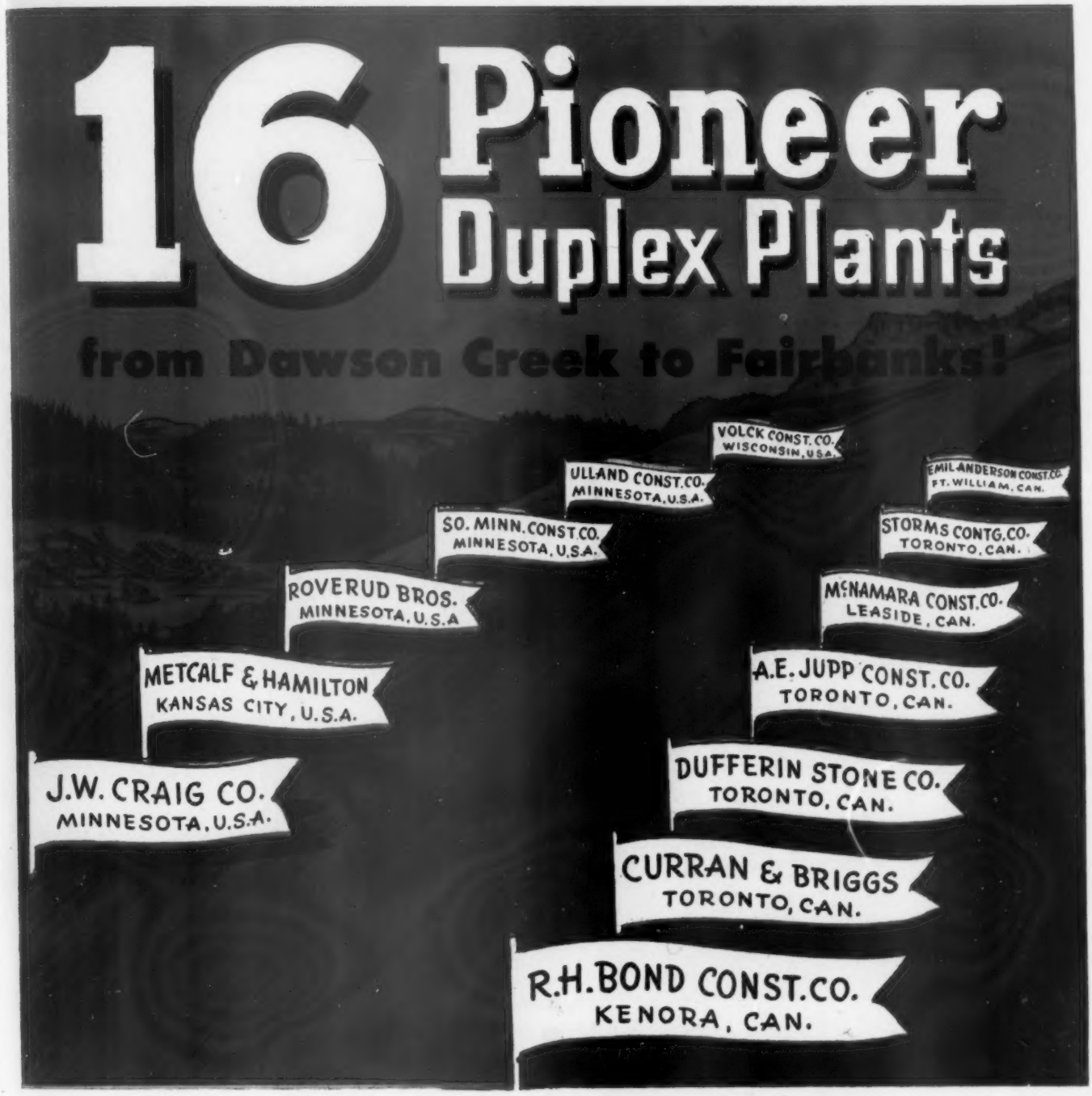
LEADERS IN DRILLING EQUIPMENT


16 Pioneer Duplex Plants
from Dawson Creek to Fairbanks!
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● The Alaska Highway was a mighty job as the world knows, the toughest job since the Panama Canal. The equipment of many manufacturers, the experience and skill of many contractors went into the building of these 1,671 miles of road.

Pioneer plants—16 of them in the hands of thirteen contractors produced a tremendous tonnage of vital aggregate. These Pioneer Duplex plants, portable equipment that moved with the road, gave dependable, continuous service in doing the complete job of crushing and screening the required product from the basic material available.

This preference by able contractors for Pioneer equipment indicates a high regard for Pioneer engineering and manufacture.

Pioneer
ENGINEERING WORKS
Jaw Crushers • Roll Crushers • Screens • Conveyors • Feeders • Washers
ENGINEERS and MANUFACTURERS of QUARRY-GRAVEL AND MINING MACHINERY
MINNEAPOLIS 13, MINNESOTA

"DELIVERING THE GOODS" FOR VICTORY!

1. Supplies to Armed Forces

2. Chemicals for making Munitions

(*Photo Underwood-Stratton*)

3. Fertilizer, Feed, to Farmers

4. Foods to Civilians here, abroad

Multiwalls, in active service all over the world, *safely* deliver more than 300 commodities essential to VICTORY!

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Cut Maintenance Costs *and* INCREASE PRODUCTION

● Here in one convenient book are charts, suggestions and part by part information that will enable even a new operator to keep Euclid hauling equipment operating efficiently for peak production. This 72-page handbook is profusely illustrated and presents detailed information on the proper servicing and operation of Euclids for longer life and better performance.

Today when present equipment must be kept in good working condition despite possible delay or difficulty in obtaining repair parts, you will find this new book especially helpful in making every operator a *better* operator. If you haven't received copies for your organization, ask your Euclid distributor to supply you or write our Service Department.

The EUCLID ROAD MACHINERY Co. • • • Cleveland 17, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH ROCK COAL ORE

Here Is the Way One Truck Does the Work of 3 or 4 Trucks with Greater Production at Less Cost!

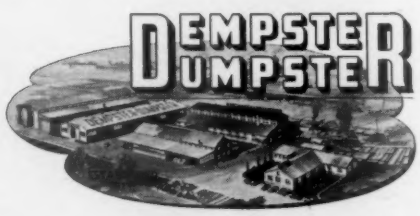
☆ In this quarry, seventeen Dempster-Dumpster heavy-duty bodies of 3-ton capacity each go through continuous, around-the-clock loading while only three trucks, equipped with Dempster-Dumpster Hoisting Units, are constantly on the move hauling loaded bodies five-eighths of a mile to dumping point and returning empty bodies for more loaded ones . . . an endless cycle of efficient top-production low-cost service.

The Dempster-Dumpster system of haulage is recognized by progressive rock, cement and lime plants, throughout the U. S. A. as essential standard equipment for minimum production cost.

But the Dempster-Dumpster is even more necessary now than ever before. One unit often eliminates 3 out of 4 trucks in previous service . . . and that means cutting costs low. It means eliminating much equipment investment. It means cutting maintenance costs, tire and gas requirements. But most important now, it means increased production with a minimum of manpower.

This particular type of body may not fit your particular need, but there's a Dempster-Dumpster body that will, whether the material to be hauled is heavy, light, dust or liquid.

Our engineers are available to help you meet today's materials handling demand. Write for our 75-page Manual on "How Others are Using the Dempster-Dumpster to Advantage." Dempster Brothers, Inc., 134 Springdale, Knoxville, Tennessee.



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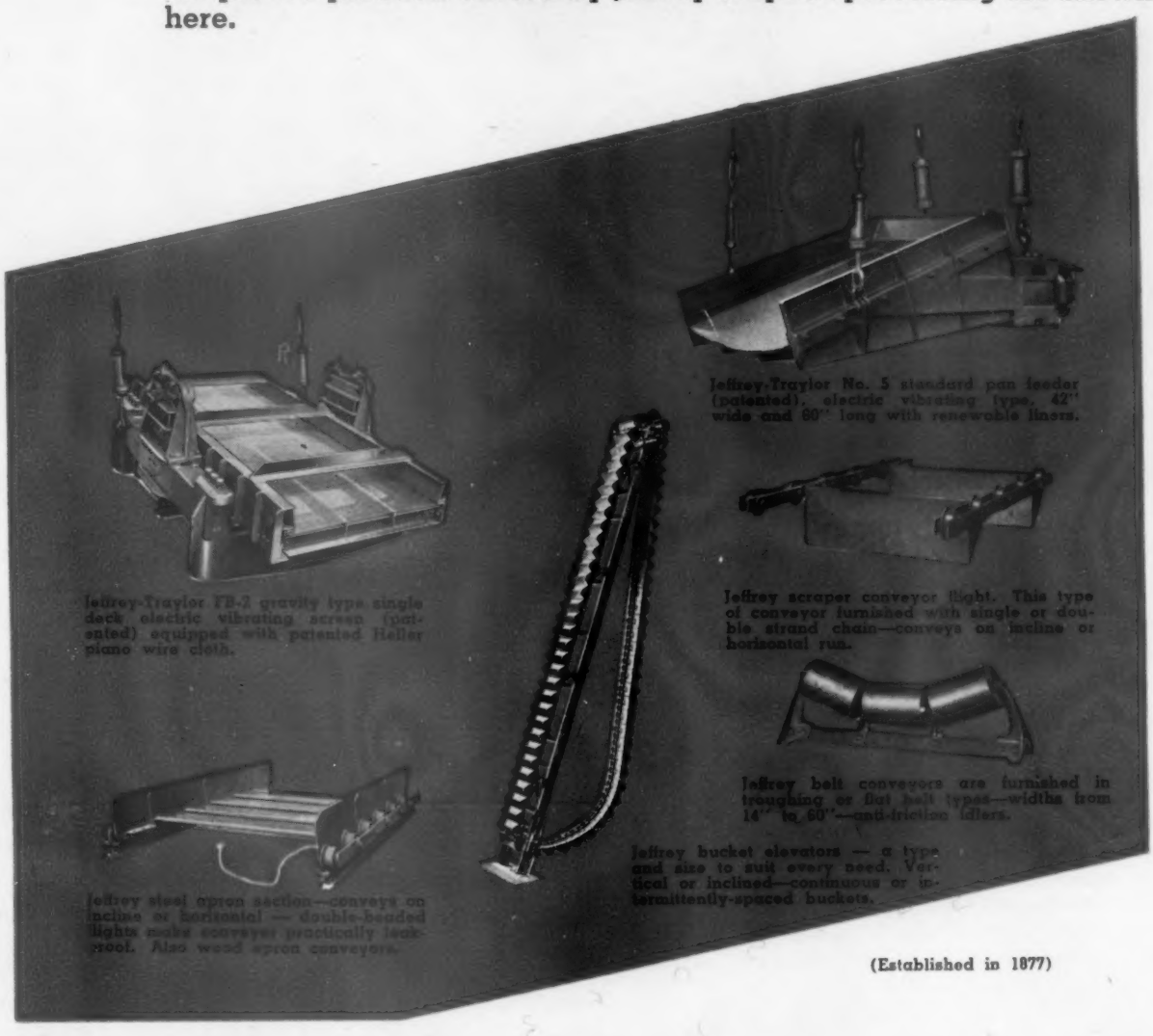

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Jeffrey-Traylor TB-2 gravity type single deck electric vibrating screen (patented) equipped with patented Heller piano wire cloth.

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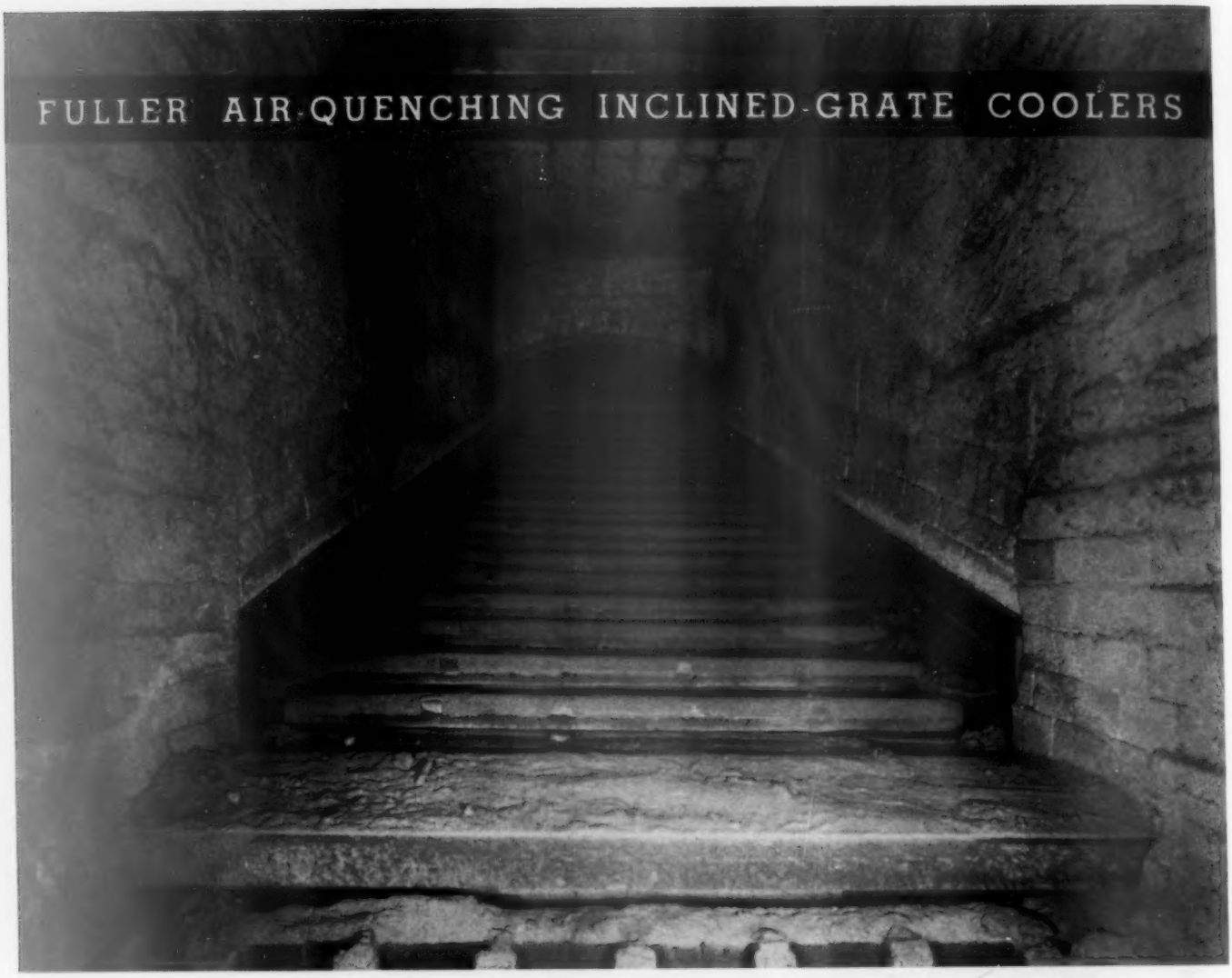

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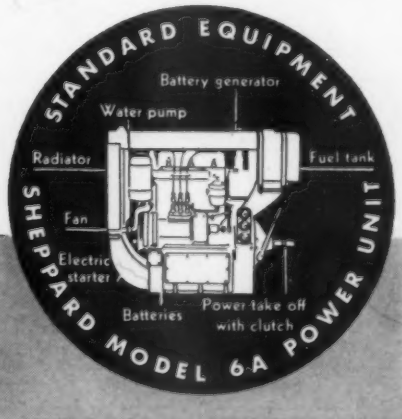

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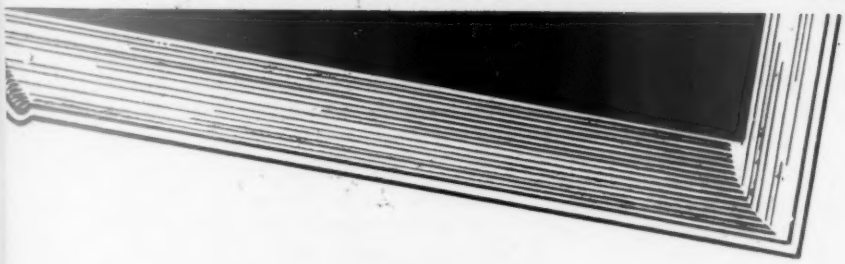

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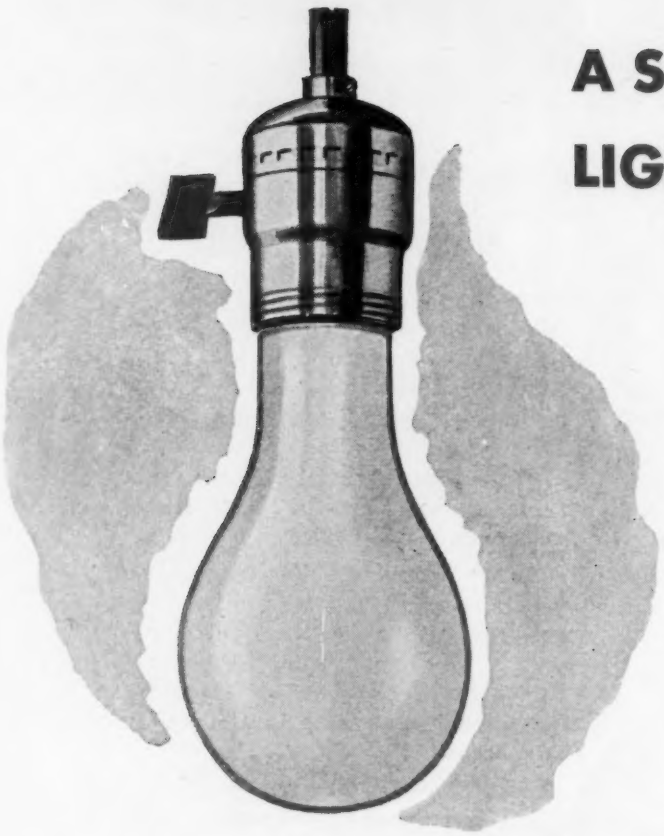

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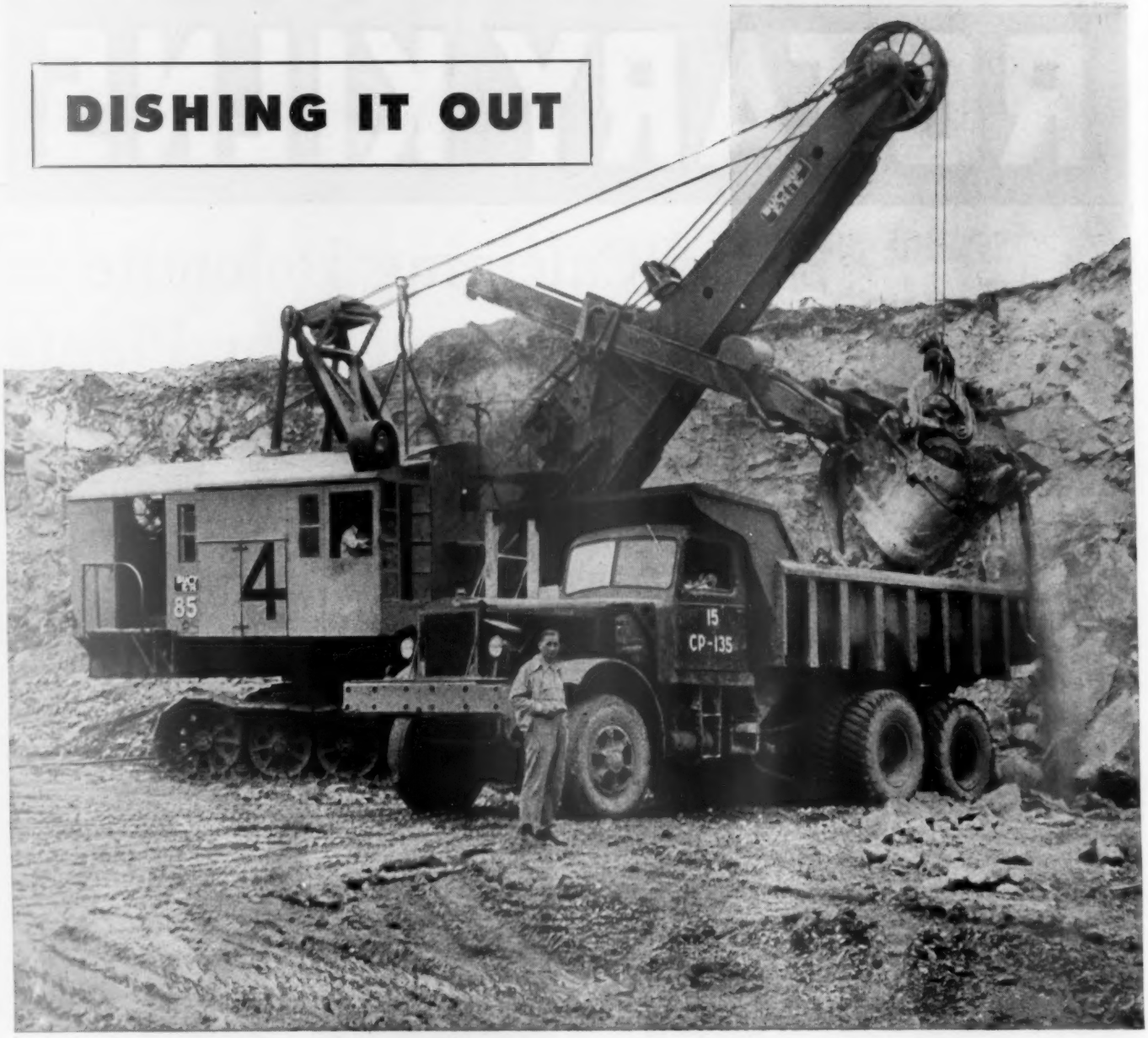

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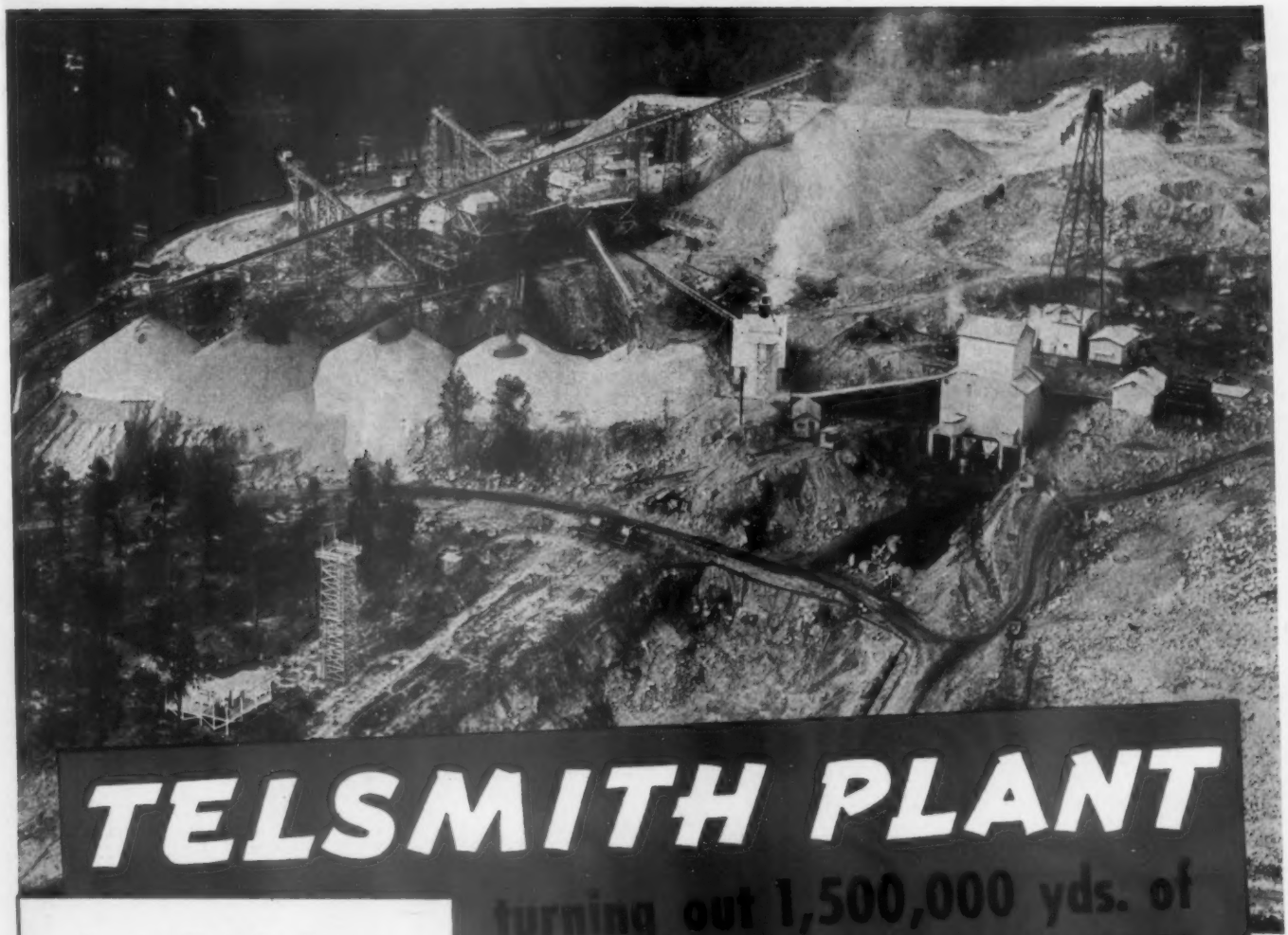

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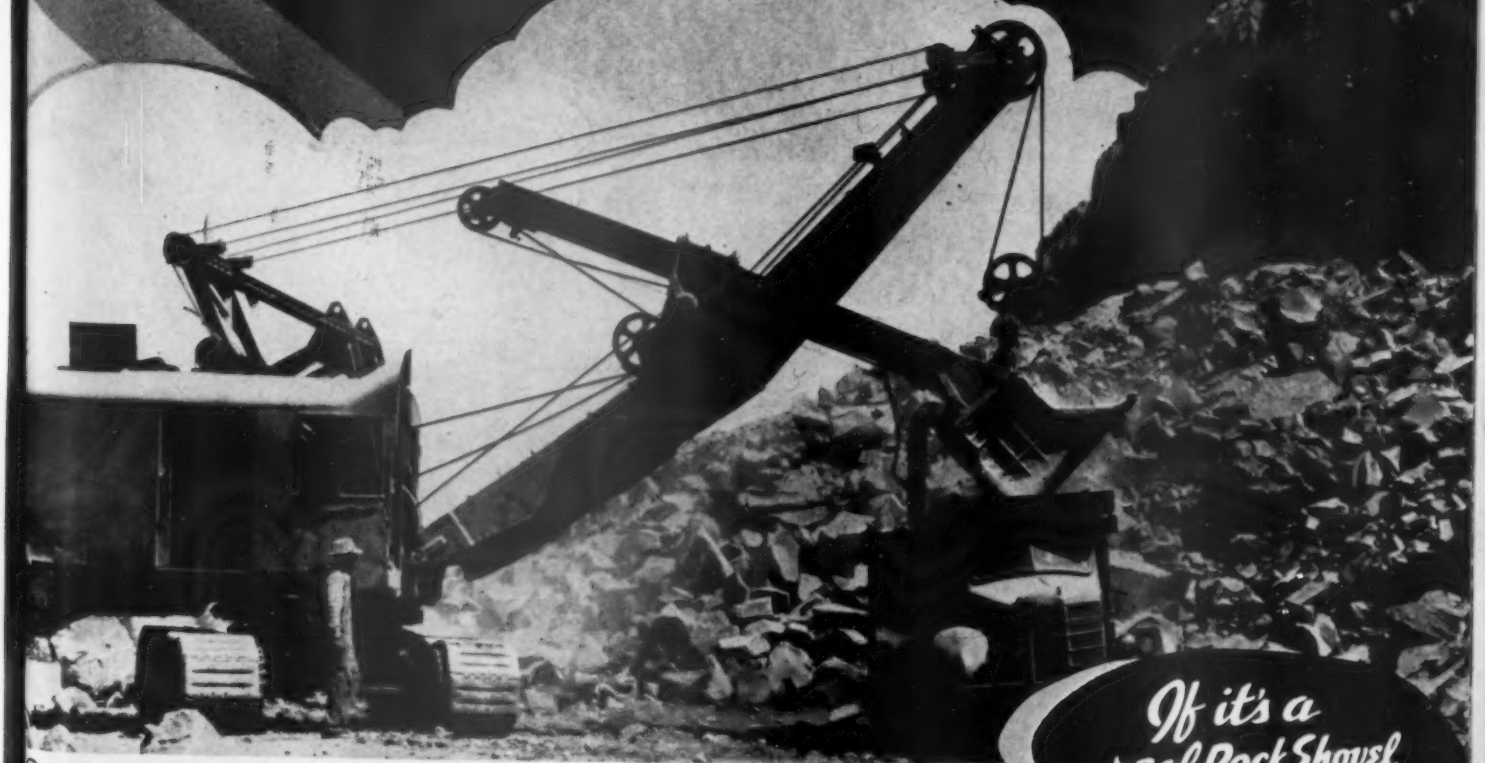

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PIT AND QUARRY

Vol. 36 MARCH, 1944 No. 9

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CONTENTS

Editorial: Full Employment — A Goal for the Nation 60
News of the Industry 63
Washington News Letter 67
The Victory Program . . . and Your Business .. 69
The Nonmetallic Phases of Magnesium Manufacture 71
Mining Engineers Discuss Geological and Operating Problems at New York 89
Separate Sessions for Sales and Operating Men Featured at NCSA Annual Convention 91
Agricultural Stone Producers Meet in Springfield, Illinois 102
Asphalt Institute Holds First Illinois State Conference 102
Concrete-Pipe Association to Broaden Scope of Activities 130
Development of Farm Market Receives Spotlight at Concrete-Masonry Meeting 131
Efficient Curing System a Feature of Worrall's Newest Block Plant 137

Personal Mention 105
Legal Developments 106
Traffic News Digest 112
New Machinery and Supplies 119
Trade Literature 123

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EDITORIAL

Full Employment—A Goal for the Nation

THE attainment of full employment for American workers after the war is a goal toward which every resident of this country should strive, for the extent to which we succeed in our efforts to achieve that desirable end will affect every one of us whether we realize it or not. The methods by which the task may be accomplished are not, therefore, academic merely but of great practical importance. Industry that is equipped for mass production can not function efficiently, profitably or with smoothness without mass markets, which require mass purchasing power based on mass employment.

The production of raw materials, which may gain public recognition only after passing through a circuitous route to consumer end-use, is not, for that reason, exempt from the effects of extensive unemployment, although it is, for that reason, often looked upon as a form of activity that is too remote from the fluctuations of general employment to carry the burden of insufficient mass buying power. The producer of nonmetallic minerals, as well as the maker of packaged food, clothing, and the rest of consumer goods, is engulfed to his hips in this problem of providing adequate mass markets for the products of mass-production industries. The fact that the output of an industry is not sold direct to the general public is no guarantee that the depressing effects of excessive unemployment will breeze by overhead without leaving deep and lasting impressions. No industry, however remote it may lie from the front line of consumer-goods buying, can escape the ultimate, if not immediate, costs of incomplete employment.

Too many people seem to believe that a sufficient degree of employment to sustain American industry on a profitable basis will come automatically immediately after the completion of the reconversions that will follow the war. The outlook of such persons rarely extends beyond the horizons of their own businesses and even more rarely beyond the limits of the industries of which their businesses form but tiny parts. Their views are economically isolationist and can not extend themselves to the conception of dangers, preventives or remedies that are of general or nationwide applicability but which do not, when looked at superficially, appear to have any meaning for them. There is not much reason to hope for intelligent solutions of national problems, such as the provision of full employment, as long as large numbers of important and influential people fail to understand that they, despite their having in a measure succeeded in their own narrow field of sheltered individualism, are interdependent and interrelated parts of a national economy, which can not suffer any important dislocation or other hurt without communicating the damaging results to every element in it.

Such an unawareness of the true nature of the problem that will face this country, as well as all other countries, after the war appears even in the Baruch-Hancock report on *War and Post-War Adjustment Policies*, which is a near-statesmanlike document of far-reaching importance. Two great problems faced the men who prepared this report: one the economic demobilization of the country's industries, the other the provision of reasonably full employment for the workers released by that demobilization as well as for the men returning from military service. The report approaches them in that order and devotes most of its space to recommendations bearing on the first, although it would seem to one viewing the post-war situation objectively that the problem of first importance is that of providing full employment. We do not solve the country's post-war problems automatically merely by cushioning the shocks of reconversion for those industries which have been employed wholly or almost wholly on war contracts. What of the thousands of industries of all sizes, which, while not engaged directly in war production, have supported the civilian population of the country and made our phenomenal accomplishments possible? What of the millions of people, released by peace, whose buying power will be essential to any kind of economic stabilization that must follow demobilization?

Of America's total annual production, $50,000,000,000 worth, or roughly one-third, represents goods needed for war but not for peace. Peace and economic demobilization will release, therefore, about one-third of our workers and our productive machinery. If unemployed, these millions of workers will be out of the market for factory-produced goods to the extent that their incomes are reduced, and, as a consequence, millions of dollars worth of potentially-productive equipment will be idle.

THIS $50,000,000,000 gap in production must be filled by production for civilian needs—needs that already exist but require the motivating force of continuous earning power for their satisfaction. For the attainment of this power the report of the National Resources Planning Board has recommended a public-works program and in some of the crucial industries a partnership between business and government. The Baruch-Hancock report mentions this method among the last of its recommendations and then only as something "to be put on the shelf for use if needed . . . to fill in the valley of unemployment". To its framers the important thing is to "fill in the valley", not to prevent the development of the valley.

We are hopeful that business men with a strong sense of devotion to national gains and mindful of the full impact of economic disturbances on their own businesses will urge upon their trade associations and their representatives in the Congress the adoption of a sane and straightforward approach to the solution of our greatest post-war problem—unemployment—by attacking it directly rather than by roundabout methods that are certain to prove to be too late and ineffective.

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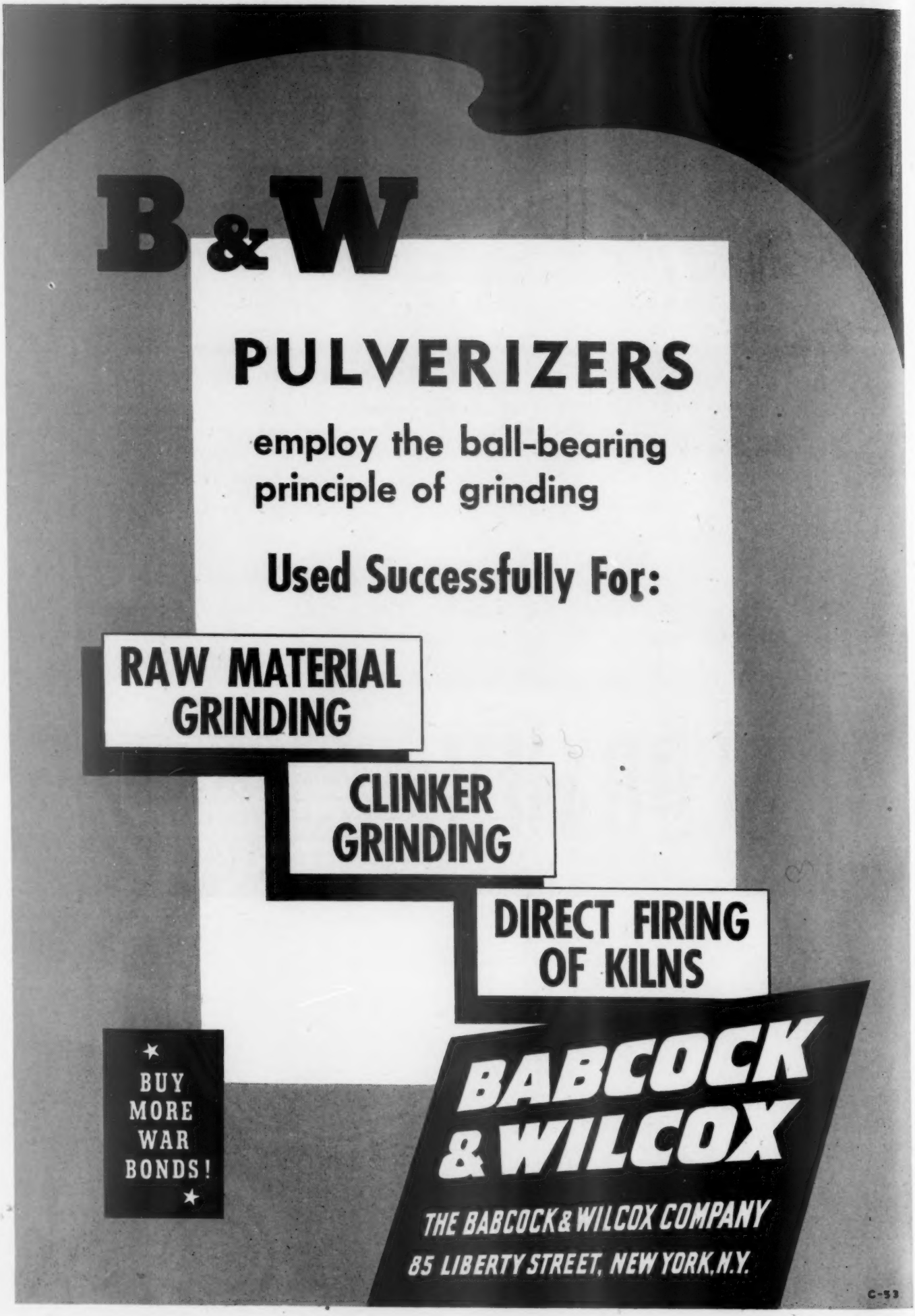
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U. S. Sees Stability for Industry After Present War Ends

If the United States avoids a post-war depression, the nonmetallic building-material industry may enjoy "reasonable stability" when peace returns, the Bureau of Mines has forecast in its new publication, *Trends in Consumption and Prices of Building Materials.*

Announcing that the production of cement, crushed stone, sand and gravel, building stone, roofing slate, building lime, and gypsum represented a business exceeding $612,000,000 (f.o.b. quarry or mill) in 1942, the Bureau reported:

"Unless the United States is plunged into a disastrous post-war depression, which all planners are seeking to avoid, the great group of building materials may expect reasonable stability in view of the extensive anticipated program of building, highway construction, and public works."

The outlook is based on material assembled by Dr. Oliver Bowles, chief of the Bureau's Nonmetal Economics Division, and Nan C. Jensen, also of the Nonmetal Economics Division. The new publication is the first in a series of reports to be issued on trends in consumption and prices of nonmetallic minerals for the period 1910 to 1942. "Within this third of a century, America has experienced more violent fluctuations from peace to war, from prosperity to adversity and vice versa, than any time in the nation's history," the report comments.

The Bureau's report shows that cement, crushed stone, and sand and gravel reached new production levels in 1942, with cement topping the list in value—$286,905,197. The report also traces the domestic production of the nonmetallic building materials from 1910 to 1942, inclusive, and shows the total value for each commodity, its average cost per ton (f.o.b. quarry or mill), price index, net imports, and apparent consumption.

Several of the commodities had lower f.o.b. values at the quarry or mill in 1942 than in 1918, the Bureau's survey shows. Following is a comparison:

	1918	1942
Cement, per bbl.....	$1.59	$1.53
Crushed stone, per ton..	.95	.93
Sand and gravel, per ton	.61	.62
Building stone, per cu. ft.	.87	.92
Roofing slate, per square.	5.84	8.87
Building lime, per ton...	8.51	8.85
Gypsum, per ton.....	1.86	1.45

Gleason New President of Wolverine Portland

After serving the Wolverine Portland Cement Company for a year and a half as executive vice-president, Roger C. Gleason has been elevated to the presidency. He succeeds C. C. Jones.

Mr. Gleason was with the Johns-Manville Corporation for many years and was part owner of the Wallfill Company, Chicago, and Insulation Equipment, Inc., just prior to his joining the Wolverine company.

Death Takes Manager of Wisconsin Plant

John Haas, 47, in charge of the Wausau, Wisconsin, crushing and roofing-granules plant of the Minnesota Mining & Manufacturing Company, died recently after a brief illness. He had been at Wausau since 1934. Before that he was associated with the Traylor Engineering & Manufacturing Company and supervised the installation of the Traylor crushing equipment in the Wausau plant which led to his accepting the position as plant manager there.

He leaves his widow, two brothers and two sisters to mourn his untimely death.

B. F. Affleck, 74, Prominent Cement Industrialist, Dead

B. F. Affleck

Benjamin Franklin Affleck, 74, former president of the Universal Atlas Cement Company and of the Portland Cement Association, died February 13, apparently of a heart attack, shortly after he had shoveled the snow from in front of his home at 800 Humboldt avenue, Winnetka, Illinois, a Chicago suburb.

He had been a business leader in Chicago for many years, having started his career with the Harrison Machine Works. He was later employed by the St. Louis, Alton & Terre Haute Railroad and the Illinois Steel Corporation.

In 1906 he joined the Universal Atlas Company as sales manager, and was made president in 1915. He retired from that post in 1936, but remained as a director of the firm.

He served as president of the Union League Club in 1928, the Chicago Club and the Executives Club in 1939 and 1940, and of the Engineers Club in 1916.

Mr. Affleck was a native of Belleville, Illinois.

He is survived by his widow and two daughters.

San Diego Producer Buys Bliss Plant

The sand-and-gravel plant operated by the late Carl G. Bliss at Otay, California, has been sold to the H. G. Fenton Material Company of San Diego for a reported $135,000.

The Fenton firm has been producing sand and gravel at another plant near Otay as well as in several other locations in southern California.

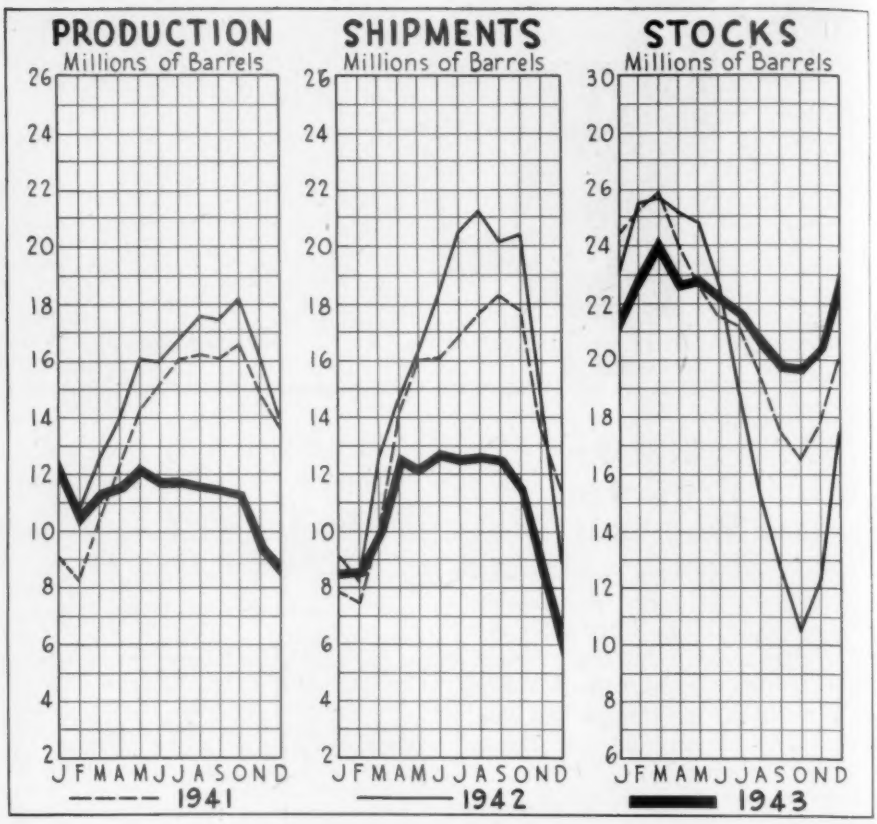
Deferred Back-Log of Construction to Aid Cement Industry

It is notable that the declines in annual output and shipments of cement in 1943 (see chart at right) were less severe than the falling-off in total construction activity which was estimated on a value basis by the Department of Commerce to be 43 per cent. below 1942.

Although the peak activity of wartime construction reportedly was reached during the July-September quarter of 1942, the long-term trend in production of finished cement continued upwards until February, 1943. This extension past the turning point in structural activity resulted largely from the necessity of rebuilding the depleted stocks of cement both at and away from the producing mills. In February the steady rise, that had started in the middle of 1940, was reversed sharply and the long-term trend in output declined at an accelerating rate each month until December, 1943. In the latter month, the rate of decline lessened slightly but a sizable proportion of the month's production entered stocks.

Operating activity of the Portland cement industry utilized 54 per cent. of capacity in 1943; a much lower rate than the 74 per cent. of capacity needed to attain the record output of 1942. From the 60 per cent. of capacity used in January, the rate of operations fell to 54 per cent. in February and March and then increased to 59 per cent. in May. After May the monthly per cent. of capacity used declined slowly to 53 per cent. in October and then dropped to the lowest monthly utilization during the year of 40 per cent. in December. Plant activity in 1943 was highest in Puerto Rico (115 per cent. of capacity) and in the continental United States in the Virginia-Georgia - Florida - Louisiana district (86 per cent. of capacity). It was the lowest in the Western Pennsylvania-West Virginia district where only 36 per cent. of capacity was utilized in 1943.

War controls on the cement industry were increased during 1943 and were directed primarily towards conservation of manpower, equipment, fuel, power, and transportation facilities. The general order on construction, Conservation Order L-41 of the War Production Board, was amended several times and the final form of November 1 appeared to be more restrictive in total effect



The Portland-cement industry during 1943, the second year of war, experienced sharp declines in productive activity and demand. Total production of 133,483,000 barrels of finished cement reported to the Bureau of Mines was off 27 per cent. and mill shipments of 127,567,000 barrels were 31 per cent. below the 1942 volumes. The rates of decline were more severe towards the end of 1943 than in the earlier months and in December output of 8,318,000 barrels was 41 per cent. and shipments of 5,603,000 barrels were 37 per cent. below corresponding data of the same month in 1942. Production and shipments of finished cement during the last 3 months of 1943 were approximately in the same volumes as average output and shipments during these months in the 1935-39 period. Mill values of bulk cement remained at $1.56 per barrel during the first half of 1943 and advanced slightly to $1.57 in the third quarter and $1.58 in the fourth quarter.

on new construction than the prior ones. General Limitation Order L-179 of the same agency was amended on February 16 and March 23 by removing the ban on assignment of bin space to customers and certain restrictions on testing. This order permits with several exemptions production only of the general purpose, moderate-heat, and high-early-strength types of Portland cement. The American Society of Testing Materials and federal emergency alternate specifications covering the three permissible types were continued through the year. Preference Rating Order P-56 under which cement companies get priority ratings to obtain maintenance, repair, and operating supplies, and also new capital equipment was amended several times during the year; the latest amendment was on January 20, 1944. Items of major plant and quarry equipment reportedly were very difficult to obtain.

With regard to cement, car-loading requirements of the Office of Defense Transportation were relaxed on shipments for dealer's warehouse stocks under the revised regulations of General Order ODT 18A of November 1, 1943, and in Amendment 1 to General Permit ODT 18A-1. Other loading requirements were not changed. As a means of conserving transportation facilities and of reducing excessive haulage, all "interzone" rail and truck deliveries greater than 20,000 pounds of bulk or packed Types I and II cements were placed under control September 25 by the War Production Board in Schedule 1 of the General Haulage Conservation Order T-1. The 93 zones set forth in the schedule were consolidated to 73 in the amended forms that were effective February 1, 1944. Under these T-regulations, authorization of the War Production Board is required only to make shipments by truck or rail from a point of origin in one zone into another zone and shipments within a zone are not subject to control. However, under Certificate 93 (July 10, 1943) to Haulage Request TR-2, producers are permitted to make arrangements

for common use of facilities and a number of cement companies have taken advantage of this provision as a means of accommodating established customers in other zones.

The cement-pricing methods of Maximum Price Regulation 224 were continued through 1943. Supplemental Order 53 of the Office of Price Administration, effective September 8, provided a flexible pricing provision. However, no adjustments of any cement prices were made during the year. An amendment effective January 11, 1944, clarified methods of pricing sales to exporters and brought the cement regulation in line with the Second Revised Maximum Export Price Regulation on direct export sales. A further amendment effective January 18, 1944, removed the requirement of reporting to the Office of Price Administration all sales of cement outside the producer's normal market area.

The Federal Trade Commission on July 17 ordered the Cement Institute and 75 member corporations to cease and desist from engaging in or continuing any combination to sell cement at prices set by use of the multiple basing-point, delivered-price system or by use of any other plan which results in identical price quotations or prices. It was claimed that the respondents' practices violated the Federal Trade Commission Act and resulted in price discrimination among customers in violation of the Robinson-Patman Act. The cement producers appealed the order and the case was certified to the Seventh Circuit Court of Appeals in Chicago. This court granted the producers a 200-day leave to prepare and present their contentions on the invalidity of the Commission's order and the case will be reopened on March 20, 1944.

The outlook for the cement industry is not favorable at least for the duration of the European War and possibly the Far Eastern War. However, post-war prospects for the industry are excellent because of the large back-log of deferred civilian construction and the possibilities for employing construction with its ready adaptability as a principal means of bridging the employment crisis expected when war plants are closed and the armed forces demobilized. The largest back-logs of deferred construction probably are in the highway and housing fields and many projects reportedly have passed the planning stage and are ready for actual construction.

Paid Circulation of Pit & Quarry Among Nonmetallic - Mineral Producers In Recent Years:

CONTINUOUSLY FOR 26 YEARS THE LARGEST PRODUCER CIRCULATION IN THE FIELD

1942	(November)	6,650
	(May)	6,513
1941	(November	6,179
	(May)	5,945
1940	(November)	5,397
	(May)	5,037
1939	(November)	4,641
	(May)	4,617
1938	(November)	4,496
	(May)	4,366
1937	(November)	3,971
	(May)	3,772
1936	(November)	3,654

82% increase in 6 Years

Independent Gravel Adds Crushing Plant

The Independent Gravel Company of Hannibal and Joplin, Missouri, has leased a building near the Alton Railroad Company tracks at Louisiana, Missouri, and will install machinery to crush stone that is being quarried from the bluffs near there. The rock formation, which when powdered resembles talc and which is a base for putty, was discovered in an old beer cellar cave.

The Hannibal company bought five acres of land from James Conrad in the early part of 1941 and began quarrying the stone, trucking it to Hannibal. G. M. Bishop of Hannibal is in charge of the operations at Louisiana. Several months ago the company opened a second tunnel in the river bluff.

Universal Atlas Advances Wiggins

Fred T. Wiggins, formerly sales manager, Birmingham, has been appointed assistant to vice-president, general sales, Universal Atlas Cement Company, New York. Robert H. Bond becomes sales manager at Birmingham.

Mr. Wiggins joined the sales department of Universal Atlas in 1926 and held various positions until 1934 when he was appointed sales manager at Birmingham. Mr. Bond joined Universal Atlas as a salesman in 1927.

Correction

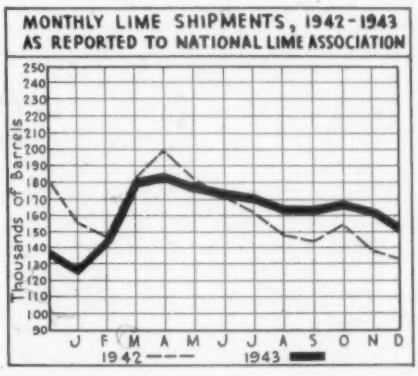
In the January, 1944, issue of PIT AND QUARRY the plant illustrated on page 133 described as the Schroeder portable plant was actually that of E. W. Wylie. This Pioneer portable crushing-and-screening plant was described on page 134 of that issue.

All-Time Production Record Attained by Fluorspar Industry

The domestic fluorspar industry was called upon to supply an unprecedented demand in 1943 and producers responded by producing and shipping 408,000 and 406,000 short tons, respectively, of finished fluorspar, gains of 21 and 13 per cent. over 1942, the previous record year, according to the Bureau of Mines. Production and shipments in 1943 were adequate to cover domestic consumption, which amounted to 386,000 tons, an increase of 7 per cent. over 1942, the former record year.

Stocks of finished fluorspar in the United States ranged between 110,000 and 117,000 tons during the first six months of 1943, but since July they have increased progressively and at the end of the year totaled 167,000 tons, as compared with 115,000 tons at the close of 1942.

Mines in Illinois and Kentucky supplied about 76 per cent. of the total fluorspar shipped in 1943, as compared with 82 per cent. in 1942 and 86 per cent. in 1941. Shipments from mines in Illinois and Kentucky were only 4 per cent. greater in 1943 than in 1942, whereas those in the other producing states gained 51 per cent.



According to data collected by the National Lime Association, 61 companies in December, 1943, shipped 149,625 tons of lime (109,399 quicklime; 40,226 hydrate). Reporting companies represent 44.0 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry, the total shipments for the month by all plants were approximately 375,000 tons. Shipments of lime by users for December, 1943, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	3,071	8,103
Building	7,082	10,596
Chemical	99,246	21,527
Total	109,399	40,226

Output of Bauxite More Than Double Previous Record

Bauxite production and shipments in the United States in 1943 were more than double the previous records of 1942 and were almost seven times the 1941 totals, according to preliminary figures compiled by the Bureau of Mines.

Output in 1943 was estimated at 7,026,040 short tons (dried bauxite equivalent) compared with 2,966,221 tons in 1942, while mine shipments were estimated at 6,752,250 tons in 1943 compared with 2,768,343 tons in 1942. Although data on imports of foreign ore are not available for publication, it may be stated that a substantial addition to the total supply resulted from imports which reached a new all-time record, more than 60 per cent. greater than in 1942. Domestic production and imports in 1944 are expected to be considerably less than in 1943 owing to the recent cutback in alumina and aluminum production announced by the War Production Board and to the large stockpiles of bauxite held both by the Metals Reserve Company and private industry.

Farm Limestone Bids Start at 75 Cents

Bids for 9,150 tons of agricultural limestone to be supplied Champaign County, Illinois, farmers through the county AAA committee have been approved by the state AAA committee. The limestone, to be delivered either f. o. b. truck or f. o. b. rail is being purchased at from 75 cents to $1.35 per ton, the bulk of it at 75 cents.

Bids approved by the state committee were submitted by Dolese & Shepard Company, Chicago, from its quarry at McCook; Materials Service Corporation, Chicago, from quarries at Fairmount and Thornton, and the Lehigh Stone Company, Kankakee.

Petoskey Portland Re-elects Officiers

The Petoskey Portland Cement Company held its annual meeting and election of officers at the company's headquarters in Petoskey, Michigan, recently.

John L. A. Galster was re-elected as president and treasurer; George W. John was again named as vice president and general manager; Homer Sly, vice president; H. H. Lucas, vice president and traffic manager; Henry Galster, vice president and assistant treasurer; and E. O. Nyman, secretary.

Pioneer Talc Man Dies After Long Illness

Willis H. Loomis, 73, president and organizer of the W. H. Loomis Talc Corporation of Gouverneur, New York, passed away in Boston on February 12 after an illness of nearly a year. He was a native of New York State and formed the talc company in 1919. The concern, one of the largest of its kind in the world, operates three plants and four mines.

Mr. Loomis was said to be the first to produce finely-ground talc ready for use by purchasers. He pioneered the method of double air flotation for greater fineness and uniformity of the product.

Fire Damages Crushing Plant in Missouri

Flames swept through heavy timbers supporting the crushing plant of the Heumader Quarry Company at St. Joseph, Missouri, on February 11, and destroyed the main portion of the plant.

The amount of loss was not determined, but it was known to be extensive. No one knew what started the blaze. Firemen went to the scene, but the flames had too great a start.

New Corporation Will Produce Sand, Gravel

Incorporation papers have been issued by the secretary of state of Illinois to the Sheridan Gravel Company, with offices at 314 Fifteenth street, Moline. Officers are listed as Oscar W. Ellis, H. B. Smith and L. E. Greim.

It is stated the new corporation is an operating company formed to produce gravel from pits in LaSalle County.

McGrath Company Buys Pekin, Illinois Plant

The McGrath Sand & Gravel Company of Lincoln, Illinois, has announced the acquisition of the Springfield-Pekin Sand & Gravel Company of Pekin, Illinois.

Operations at the Pekin plant were scheduled to start March 1.

Keep on Buying War Bonds

Decline in Gypsum Production Easing Off, Bureau Says

War controls on civilian construction continued to have a depressing effect on the gypsum industry through 1943. The reduced rate of operations from 1942 may be measured by the respective declines of 15 and 16 per cent. in output of domestic crude and production of calcined gypsum. Although the long-term trend in activity was downward throughout 1943, there was a marked easement in the rate of decline in both the third and fourth quarters.

Markets for gypsum building products, as gaged by sales reports to the Bureau of Mines, were affected sharply by the changes in types of materials required in the permitted wartime construction compared with peacetime building. Demand for certain of the prefabricated products was strong and sales of wallboard and laminated board advanced to record volumes. On the other hand, sales of the "built-in" products—plasters, lath, and tile—fell far below the 1942 levels.

Indicated consumption of industrial plasters increased in 1943 and, of the uncalcined products, sales of agricultural gypsum rose to record levels whereas the tonnage of portland-cement retarder fell sharply from the 1942 consumption.

Heart Attack Fatal to Oklahoma Producer

Henry Dolese, 73, one of the founders of the Dolese Brothers Company, died February 8 in an Oklahoma City hospital following a heart attack. A native of Illinois, he had made his home in Oklahoma City since September, 1943.

Mr. Dolese was born in Chicago, and with the aid of his brothers, John and Peter Dolese, founded that company about 1904. The company engaged in the production and sale of sand, gravel, crushed stone, ready-mixed concrete and in handling contractors' supplies.

Maritime Commission Honors W. B. Rodgers

The U. S. Maritime Commission on January 15, 1944 named a Liberty ship launched at Richmond, California, in honor of the late Captain Wm. B. Rodgers, one-time president of the Rodgers Sand Company, Pittsburgh.

WASHINGTON NEWS LETTER

Baruch-Hancock Report

another P and Q exclusive

ASIDE from the political fireworks which accompanied the overriding of the tax-bill veto, the highlight of the past months in Washington was the appearance of the Baruch-Hancock report on *War and Post-War Adjustment Policies*, prepared for the Office of War Mobilization. While frequently reiterating the theme that victory in the war must outweigh all other consideration, Mr. Baruch is equally insistent that plans for the return to peace must be laid before the end of the war.

Although the report is less concerned with long-range economic policy than with such problems as contract terminations, disposal of surplus property, and provision for business credit facilities, it does represent a significant impetus to set in motion the administrative machinery which will be required during the demobilization period.

A Surplus War Property Administration, under William L. Clayton, former Assistant Secretary of Commerce, has already been set up in the O.W.M. in line with the recommendations contained in the report. The new administrator, who is to unify the procedures and policies of all agencies, has been given full authority over all phases of the disposal of government-owned surpluses, and will operate through four major outlets: Treasury Procurement Division for the disposal of consumer-type goods, a Reconstruction Finance Corporation subsidiary to handle capital and producer goods, the Maritime Commission for the sale of ships and other maritime property, and the Food Administrator for the disposal of all food supplies.

The disposal of surpluses is to form part of a larger program for taking the government out of business. Other elements in this program include the quick, fair, and final settlement of terminated war contracts under adequate safeguards against fraud, the provision of uniform termination articles for prime as well as subcontracts, and prompt clearance of government property from private plants in order to expedite the return to normal production.

The authors of the report recognize that the existence of large surpluses at the end of the war can exert a generally healthful effect upon the economy, if properly handled. The inevitable inflationary tendencies developing in the transition period can be effectively combated, not only by the balancing influence of these resources on prices but, perhaps more importantly, by the vast production capacity represented by government-owned plants. Roughly two-thirds of the government's war-time investment in new facilities is likely to have peace-time production possibilities, and the report recommends wide publicity to encourage the fullest use of these plants through leasing and subdivision, as well as more direct methods of disposal.

To Keep 'Em Flying—Keep on Buying War Bonds

To many officials the most valuable proposal contained in the report is that which calls for the immediate preparation of an "X Day Reconversion Plan," based upon the assumed end of hostilities in Europe on "X Day." Such a plan, elemental as it may sound, has long been conspicuous by its absence, even in rough outline, not only because of a natural mental resistance on the part of the armed forces to divert their attention to peace before the war was in a decisive stage, but also because of the extremely knotty nature of the problems which must be resolved.

The first of these objections has a good deal of validity; the experience of the last few months has shown that indiscriminate talk as to the resumption of civilian production can exert a serious adverse effect upon war production. But it would be rather difficult to refute Mr. Baruch's contention that we must be as prepared for a sudden collapse of the Nazis in Europe, as for a long drawn-out struggle. Few people would care to disagree with his summarization: "Plan for peace? Yes. Let up on the war? No."

As to the other source of difficulty, the far-reaching influence of O.W.M. recommendations upon the activities of other government agencies should bring about such a co-ordination of effort among them as will facilitate, to a considerable extent, the solution of the many complexities inherent in reconversion problems.

It may, therefore, be assumed that a co-operative X Day plan, prepared jointly by the armed services and the War Production Board, will be forthcoming in the very near future. To meet the Baruch-Hancock specifications such a plan will have to: "seek to estimate cancellations in advance, the industries affected and the resources likely to be released; make tentative selections of the industries and plants to be freed, weighing how these selections can be guided so as to contribute, first, to greater war efficiency, and, second, with war needs satisfied, to the speediest resumption of civilian production and to an orderly changeover from war to peace." If the responsible agencies succed in this task, considerable progress will have been made toward the goal of postwar prosperity.

Floating Conveyor Saves Man-Hours, Equipment

A 500-foot field conveyor, floated on pontoons, recently went into service in the pit of the Builders' Sand & Gravel Company, Indianapolis, and has proved a time and money saver for this company. As the above picture shows, the drag-line in the distance now loads directly into a hopper which feeds the material to the belt. The discharge to the plant conveyor is seen in the foreground and in the small picture below, a small vibrating screen scalping off the oversize which goes through a 924 Cedarapids jaw crusher before dropping on the belt. The floating conveyor is anchored with cables at several points to insure stability and to prevent whipping in high winds. The plant, which started operating about two years ago, was described in the March, 1943, issue of PIT AND QUARRY before the floating conveyor was installed. The owner is the Spickelmier Fuel & Supply Company of Indianapolis. Charles Rosenbarger is the plant superintendent.

Formerly the drag-line (above) loaded trucks which drove around the pit and dumped their loads into the hopper of a short belt feeding the plant conveyor. The new installation has eliminated the need for the trucks and drivers and has stepped up production at the plant (below) about 20 per cent.

the VICTORY *Program*

. . . . . AND YOUR BUSINESS

BRUCITE SALES.—Sales of brucite to producers of magnesium were exempted from price control February 24 by the Office of Price Administration. Brucite is a native magnesium hydroxide which can be used as an ore in the production of magnesium metal. It is produced in very limited quantities.

Maximum prices for brucite in such sales had been the highest prices individual sellers charged during March, 1942.

PHOSPHATE ROCK.—Some thirty large and small phosphate-rock mining companies will be represented by a newly-formed industry advisory committee the membership of which was made public February 8 by the Office of Price Administration.

Phosphate rock is used as a raw material in the manufacture of fertilizers, feeds and chemicals, and for direct application to the soil. The industry's mines are located principally in Florida and Tennessee, which supply all the United States, with the exception of the western states that are supplied from mines in Montana and Idaho. Export shipments are made from Florida and Montana.

Three O.P.A. maximum-price regulations govern the phosphate-rock industry, including the mining of all kinds of the product, among which Florida pebble and Tennessee brown phosphate rock are the principal types.

Members of the industry advisory committee are:

L. H. Carter, the American Agricultural Chemical Company, New York City; Frank S. Washburn, American Cyanamid Company, New York City; John R. Sheffield, Coronet Phosphate Company, New York City; Franklin Farley, International Minerals & Chemical Corporation, Chicago; Charles E. Heinrichs, The Phosphate Mining Company, New York City; Chester A. Fulton, Southern Phosphate Corporation, New

INDEX TO GOVERNMENTAL REGULATIONS AFFECTING THE NONMETALLIC-MINERAL INDUSTRIES AS PUBLISHED IN PIT AND QUARRY DURING THE PAST YEAR

(Made available in response to numerous requests from readers.)

DEPARTMENT OF LABOR

Executive Order 9240, Ruling of Sept. 4, 1943 (Double time for seventh consecutive day).... Oct. 1943 p. 52

Executive Order 9240, Interpretative Bulletin No. 1 (Double time and other provisions interpreted) ..... Apr. 1943 p. 38

WAGE AND HOUR DIVISION

Forty-cent minimum-wage order effective Dec. 27, 1943 ..... Jan. 1944 p. 72

NATIONAL WAR LABOR BOARD

Regional offices—List ..... May, 1943 p. 57

OFFICE OF DEFENSE TRANSPORTATION

Special Direction ODT 18A-1 (Lime-loading requirements) ..... Nov. 1943 p. 54

OFFICE OF PRICE ADMINISTRATION

MPR 188, Order A-2, Amendment 3 (Mineral-wool prices) ..... Nov. 1943 p. 55

MPR 188, Amendment 9, Mar. 27, 1943 (Price adjustments on construction materials based on local shortages) ..... May 1943 p. 57

MPR 251, Order No. 1, Mar. 12, 1943 (Certain Defense Plant Corporation construction contracts exempted from price control)..... Apr. 1943 p. 38

MPR 386, May 15, 1943. (Pricing of agricultural liming materials) ..... July 1943 p. 38

Ration Order 17, Amendment 7. (Purchase certificates for safety shoes)..... May 1943 p. 57

Supplementary Order No. 31, Dec. 1, 1942. (Pricing based on 3 per cent. transportation tax) ..... Mar. 1943 p. 59

SELECTIVE SERVICE SYSTEM

Activity and Occupation Bulletin 11, Amended Oct. 21, 1943. (Industrial silica sand including foundry added to essential industries).... Dec. 1943 p. 51

Activity and Occupation Bulletin 11, Amended Apr. 5, 1943. (Mined or quarried nonmetallic materials added to essential industries)..... June 1943 p. 49

TREASURY DEPARTMENT

Letter from Treasury Department. (Transportation tax on intra-operational trucking of minerals) ..... Apr. 1943 p. 42

Letter from Treasury Department. (Truck-and-driver hire subject to 3-per cent. transportation tax) ..... May 1943 p. 57

T.D. 5312, Dec. 16, 1943 (Exemptions from 3-per cent. transportation tax)..... Feb. 1944 p. 52

WAR MANPOWER COMMISSION

General Order No. 11 (List of essential activities) ..... Sept. 1943 p. 56

Executive Order, Feb. 9, 1943 (48 hour work week ordered) ..... Mar. 1943 p. 55

Executive Order 9328, Regulation No. 4, Apr. 18, 1943. ("Hold-the-line" order)..... June 1943 p. 52

Telegram urging aggregate and ready-mixed-concrete workers to remain on jobs..... Apr. 1943 p. 40

WAR PRODUCTION BOARD

CMP Regulations No. 5 and 5A Amended Apr. 18, 1943 (Automotive repair and replacement removed from priority restrictions)..... May 1943 p. 53

CMP Regulation No. 5, Amended May 14, 1943. (Maintenance, repair and supply ratings raised) June 1943 p. 48

CMP Regulation No. 5, Interpretation 10, Nov. 9, 1943. (Ready-mixed concrete, bituminized-aggregate and light-weight aggregate producers permitted to use MRO symbol and AA-2 rating for maintenance, repair and operating supplies ..... Dec. 1943 p. 51

Conservation Order M-311, May 20, 1943. (Scrapping of certain used automotive parts prohibited) ..... July 1943 p. 41

General Inventory Order M-161, Amendment 1, Oct. 11, 1943 (Maintenance, repair and operating supplies for miscellaneous minerals)..... Nov. 1943 p. 55

L-41, Amended Nov. 1, 1943 (Construction limitations) ..... Dec. 1943 p. 49

L-41, Direction 2, CMR Regulation No. 5, Direction 15 (Permission to install processing machinery) ..... Jan. 1944 p. 22

L-53, Amended Jan. 21, 1944. (Application Form 1319 simplified) ..... Feb. 1944 p. 52

L-53-a, Amended June 10, 1943. (Certain models of track-laying tractors made available)..... July 1943 p. 40

L-53-b, Amended June 17, 1943. (Tractor parts) Aug. 1943 p. 47

L-112, Arendment No. 1, July 10, 1943. (Industrial-power-truck purchases require authorization) ..... Aug. 1943 p. 45

L-158, Amended Jan. 20, 1944. (April 1 limit on use of AA-1 ratings on truck parts removed) Feb. 1944 p. 52

L-158, Amended Oct. 11, 1943. (Truck and trailer parts uprated) ..... Nov. 1943 p. 55

L-172, Revised July 9, 1943. (Heat-exchanger purchases require authorization) ..... Aug. 1943 p. 45

L-179 (Part 3033-Portland Cement) revoked. (Cement-bin space for special cements)..... April 1943 p. 38

L-192, Amended July 2, 1943. (Certain equipment made available for civilians)..... Aug. 1943 p. 45

L-192, Amended June 1, 1943. (Construction-machinery parts) ..... Aug. 1943 p. 45

L-192, Amended June 1, 1943. (Construction-machinery sales restrictions partially lifted).... July 1943 p. 40

L-192, Amended Apr. 19, 1943. (Four schedules of construction machinery equipment and buying regulations set up)..... May 1943 p. 53

L-217 Schedule VI, Feb. 25, 1943. (Making of truck-mixers limited to two styles)..... Apr. 1943 p. 42

L-269, Mar. 11, 1943. (Limitations on mining-machinery manufacture) ..... Apr. 1943 p. 40

P-100, Revoked June 26, 1943..... Aug. 1943 p. 47

Priority Regulation 3, Amended Aug. 10, 1943. (Repair of plant machinery and equipment).. Oct. 1943 p. 53

Building Materials Division

General Haulage Conservation. Order T-1, Revision of Schedule 1. (Cement shipping zones reduced in number) ..... Feb. 1944 p. 50

General Haulage Conservation Order T-1, Amended Aug. 6, 1943. (Cement shipments restricted) ..... Oct. 1943 p. 49

Construction Machinery Division

L-196, Amended Jan. 18, 1944. (Used construction machinery—inventory requirements modified) ..... Feb. 1944 p. 50

L-196, July 26, 1943. (Used construction equipment) ..... Sept. 1943 p. 57

P-19-L, Mar. 1, 1943. (Construction-machinery preference ratings) ..... Apr. 1943 p. 38

Containers Branch

L-279, Revised Oct. 27, 1943. (Paper bags—use of asphalted paper for hydrated lime and limestone permitted) ..... Dec. 1943 p. 51

Lumber and Products Division

Softwood Lumber Order M-208. Amended (Lumber for mining industry construction)..... Nov. 1943 p. 54

Mining Division

Agricultural-limestone machinery priorities..... June 1943 p. 48

Definition of Quota Items. (Ball-mill liners)... Nov. 1943 p. 54

P-56, Amended Jan. 20, 1944. (Machinery definition broadened) ..... Feb. 1944 p. 50

P-56, Amended Dec. 24, 1943..... Jan. 1944 p. 71

P-56, Amendment 1, Oct. 30, 1943. (AA-5 to non-serialized mines) ..... Dec. 1943 p. 51

P-56, Amendment 1 to Interpretation 1, Nov. 13, 1943. (Cut-stone producers given AA-5 rating, structural stone producers AA-2)..... Dec. 1943 p. 51

P-56, Amended May 5, 1943. (Emergency procedure for priority assistance)..... June 1943 p. 40

P-56, Amended Mar. 17, 1943. (Procedural changes) ..... Apr. 1943 p. 41

P-58, Amended, revoked Dec. 24, 1943..... Jan. 1944 p. 71

P-73, Amended, revoked Dec. 24, 1943..... Jan. 1944 p. 71

York City; Charles T. Prindeville, Swift & Company, Chicago; and Herbert H. Meyers, Virginia-Carolina Chemical Corporation, Richmond, Virginia.

TRUCK PLANS, JOINT-ACTION.—The Office of Defense Transportation on February 10 prescribed the procedure to be followed by private motor-truck operators seeking O.D.T. approval of joint-action plans designed to conserve vehicles, tires, gasoline and man power.

The procedure applies to all private carriers of property under the jurisdiction of the Private Carrier Section of the O.D.T.'s Division of Motor Transport, except trucks used for the retail delivery of solid fuels, which are covered in a separate program. It does not apply to farm or tank trucks, which come under programs administered by other O.D.T. sections.

Joint-action plans submitted by private truck operators for O.D.T. approval musts (1) be in writing and signed by all participants, (2) show the correct legal name and full address of each participant, (3) specify methods of joint-action to be used and the practical application of these methods to the particular operation of the participants, (4) describe the territory involved, (5) show name and address of designated correspondent, (6) show the approximate number of other carriers in the area performing like services, (7) contain an estimate of the conservation to be accomplished, (8) the present method of operation, and (9) give assurance that adequate transportation service will be maintained.

TRANSPORTATION TAX EXEMPTION.—Important amendments have been made to Section 3475(b) of the Internal Revenue Code which relate to the tax on the transportation of property in that, from the point of view of producers, the governmental exemption has been substantially broadened. The text of Treasury Decision 5312, which includes the new regulations of the Bureau of Internal Revenue applicable to the governmental exemption, follows.

(T.D. 5312)
TITLE 26—INTERNAL REVENUE
CHAPTER I
SUBCHAPTER A—PART 143
TAX ON AMOUNTS PAID FOR TRANSPORTATION OF PROPERTY
Governmental Exemption
TREASURY DEPARTMENT
Office of Commissioner of Internal Revenue
Washington 25, D. C.

In order to conform Regulations 113 (Part 143, Title 26, Code of Federal Regulations, 1943 Sup.) to Public Law 180 (78th Congress), approved November 4, 1943, Subpart D of such regulations is amended to read as follows:

SUBPART D—GOVERNMENTAL EXEMPTIONS

(SEC. 3475. TRANSPORTATION OF PROPERTY.—AS ADDED BY SECTION 620(a) OF THE REVENUE ACT OF 1942)

(b) Exemption of Government Transportation—The tax imposed under this section shall not apply to amounts paid by or to the United States or any agency or instrumentality of the United States for the transportation of property.

PUBLIC LAW 180—78TH CONGRESS, 1ST SESSION, APPROVED NOVEMBER 4, 1943.

That section 3475(b) of the Internal Revenue Code (relating to the tax on the transportation of property) is amended to read as follows:

"(b) Government Transportation.—The tax imposed under this section shall not apply to amounts paid for the transportation of property to or from the Government of the United States, or any State, Territory, or political subdivision thereof, or the District of Columbia, or to amounts paid to the Post Office Department for the transportation of property."

SEC. 2. The amendment made by section 1 shall take effect with respect to amounts paid, on and after the first day of the first month which begins more than ten days after the date of the enactment of this Act, for the transportation of property on and after such first day.

SEC. 143.20. Amounts Paid for Transportation Originating Prior to December 1, 1943.—An amount paid for the transportation of property, where such transportation originated prior to December 1, 1943, is exempt from the tax (1) if paid directly to a carrier by the United States or any agency or instrumentality thereof, or by a State, or political subdivision thereof, or (2) if paid to the United States or any agency or instrumentality thereof. In either case an exemption certificate is not required.

SEC. 142.21. Amounts Paid for Transportation Originating on and after December 1, 1943.—An amount paid on or after December 1, 1943, for the transportation, originating on or after such date, of property to or from the Government of the United States, or any State, Territory, or political subdivision thereof, or the District of Columbia, is exempt from the tax. Where the shipping papers show the consignor or consignee to be the Government of the United States, or any State, Territory, or political subdivision thereof, or the District of Columbia, or any agency or instrumentality of any of the foregoing, such papers may be accepted by the carrier as proof of the exempt character of the shipment. A United States Government bill of lading may likewise be accepted as evidence of the exempt character of the shipment. In any case covered by the two preceding sentences, a certificate of exemption is not required.

All amounts paid to the Post Office Department for the transportation of property are exempt from the tax.

For penalties applicable to any person falsely claiming exemption under this section or section 143.20, see section 1718 of the Internal Revenue Code, made applicable to the tax on amounts paid for the transportation of property by section 3473 thereof.

(This Treasury Decision is issued under the authority of sections 3472 and 3791 of the Internal Revenue Code (53 Stat. 423, 467; 26 U.S.C. 3472, 3791) and Public Law 180 (78th Congress), approved November 4, 1943.)

ROBERT E. HANNEGAN,
Commissioner of Internal Revenue.

Approved: December 16, 1943.

JOHN L. SULLIVAN,
Acting Secretary of the Treasury.

TRADE NOTES

The Vulcan Iron Works announces the appointment of Howard G. Jones as its New York representative. Mr. Jones, who has been connected with the home office in responsible capacities for nearly 20 years, will have full charge of the New York office, at 50 Church Street, succeeding Thomas MacLachlan, who recently resigned to accept a position with another company.

The appointment of George B. Doner as sales manager of the rock-drill division is announced by the Chicago Pneumatic Tool Company, New York City.

Recognizing the close interrelation of modern processing industries, the Allis-Chalmers Manufacturing Company, Milwaukee, has set up a new Basic Industries Department which will correlate the activities of departments which had formerly been independent units. The new department comprises the crushing, cement and mining machinery division, flour-milling and oil-extraction division, and saw- and pulp-mill division.

Walter Maxson, formerly manager of the Crushing, Cement and Mining Department, has been appointed to manage the Basic Industries Department.

In reorganizing, Allis-Chalmers also announces the establishment of a separate Texrope department. Since the Allis-Chalmers organization developed the Texrope line in 1925, the multiple V-belt power transmission section had been a part of the milling-machinery department. T. C. Knudsen has been named manager and chief engineer of the new Texrope department.

The Kensington Steel Company, Chicago, has been awarded a white star for addition to its Army-Navy "E" flag for continuing to maintain high standards of production achievement.

Libraries Appeal for Technical Journals

The American Library Association created in 1941 the Committee on Aid to Libraries in War Areas, headed by John R. Russell, librarian of the University of Rochester. The committee is faced with numerous serious problems and hopes that American technical men and scientists will be of considerable aid in the solution of one of these problems.

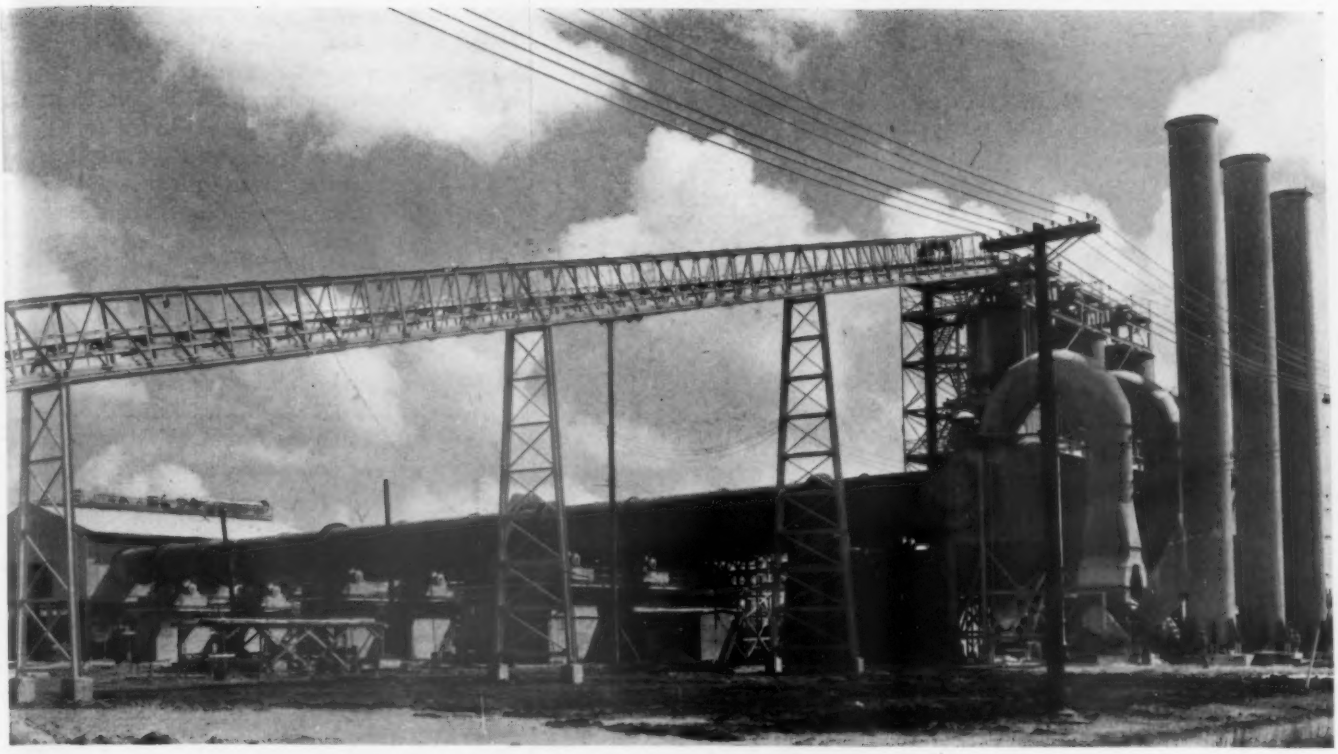
One of the most difficult tasks in library reconstruction after World War I was that of completing foreign institutional sets of American scientific and technical periodicals. The attempt to avoid a duplication of that situation is now the concern of the committee.

Many sets of journals will be broken by the financial inability of the institutions to renew subscriptions. As far as possible they will be completed from a stock periodical being purchased by the committee. Many more will have been broken through mail difficulties and loss of shipments, while still other sets will have disappeared in the destruction of libraries. The size of the eventual demand is impossible to estimate, but requests received by the committe already give evidence that it will be enormous.

With paper shortage attempts are being made to collect old periodicals for pulp. Fearing this possible reduction in the already limited supply of technical and scientific journals, the committee hopes to enlist the cooperation of subscribers to PIT AND QUARRY in preventing the sacrifice of this type of material to the pulp demand. It is scarcely necessary to mention the appreciation of foreign institutions and technical men for this activity.

Questions concerning the project or concerning the committee's interest in particular periodicals should be directed to Dorothy J. Comins, Executive Assistant to the Committee on Aid to Libraries in War Areas, Library of Congress Annex, Study 251, Washington 25, D. C. Readers who have back numbers of PIT AND QUARRY, for which they no longer have a need, should address that office saying what copies they are able and willing to contribute.

The Neff & Fry Company, manufacturers and builders of both concrete stave and monolithic storage bins, announces the appointment of D. H. Herbster as vice-president and general manager. He has been with the company for the past six years.



A view of the Dow magnesium plant at Velasco, Texas, showing the rotary lime kilns and slaker building.

THE NONMETALLIC PHASES OF MAGNESIUM MANUFACTURE

By W. E. TRAUFFER

another P AND Q exclusive

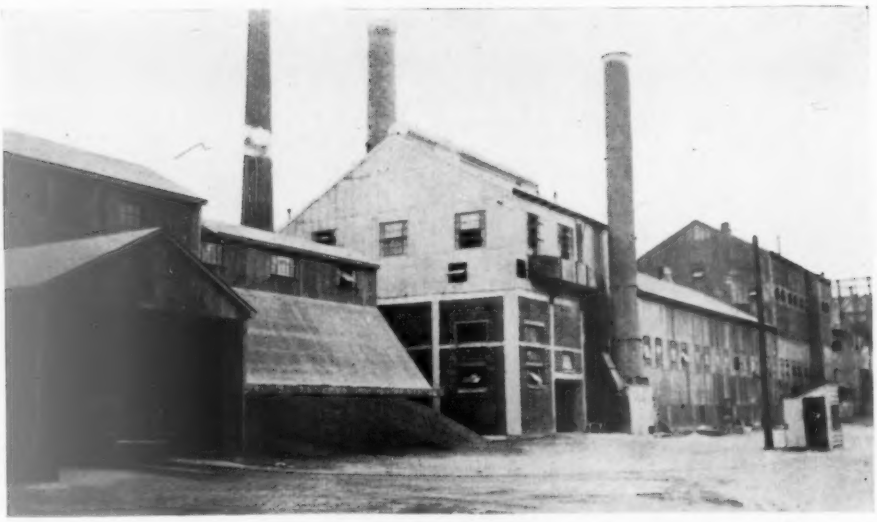
THE urgent need for magnesium metal created by our vast airplane-manufacturing program and the tremendous scale of the aerial offensive against the Axis nations has been responsible for a production schedule which exceeds anything ever before undertaken. As a result the production of this vital metal, which was only 12,250,000 pounds in 1940, has now reached 523,000,000 pounds annually. This output is coming from 14 plants in different parts of the country whereas in 1918, near the end of World War I, five plants produced a total of only 284,000 pounds annually. The price of magnesium then was several dollars per pound. By 1940 it had been reduced to 27 cents and is now 20½ cents per pound.

In the early stages of this program most of the magnesium produced was used for incendiary bombs, flares, etc., but its growing use as an alloy in the manufacture of structural airplane parts now calls for more than one-half of the total output and this demand is still increasing. It is apparent, however, that the industry's capacity now is in excess of the present war demands and no definite plans for additional expansion are now being made.

There is considerable difference of opinion among authorities on magnesium as to the post-war potentialities of this industry. Some believe that there will be a repetition of the drop in production after World War I, when only one of the five producers in this country remained in operation. Others believe that, with more research and experience, the structural uses of magnesium will create a commercial demand which will strain the capacity of the industry within a few years after the war's end. The more optimistic predict the eventual use of magnesium and its alloys for almost every structural purpose.

The one remaining producer after the last war was the Dow Chemical Company which entered the field in 1916 as the first producer in this hemisphere when imports from Germany, up to then our only source for this metal, were cut off by World War I. The demand for magnesium increased so slowly during peace times that production at Dow's Mid-

● **This article describes most of the magnesium plants which have been built on this continent to supply vital metal for our war effort. It is published to point out to nonmetallic-minerals producers the extent to which nonmetallic-minerals production enters into the several methods of magnesium manufacture now in use, a subject which has been neglected in previous articles. A similar aim was the chief reason for publishing the bauxite and alumina article which was a feature of the January issue. In gathering the material for this magnesium article the writer traveled from Connecticut to California and from Texas to Michigan and actually visited and inspected ten of the existing magnesium plants.**



Crushing, calcining and mixing buildings (Nelco, Canaan).

land, Michigan, plant by 1938 had reached only 4,800,000 pounds annually. With the outbreak of the present war this plant was expanded and in 1940 produced 12,250,000 pounds, the total output for this country.

When our entry into World War II appeared inevitable, steps were taken greatly to increase the output of magnesium metal by the government financing of additional plants. The goal set for 1941 was the construction of six new plants with a total capacity of 382,000,000 pounds. This was increased repeatedly until it reached the present high level. As a result, this country is now undoubtedly the largest producer of magnesium, whereas in 1938 it ranked far below Germany, slightly below Great Britain, and only a little above France, Japan and Russia.

As can be seen from the accompanying table, most of the 14 plants in this country are owned by the Defense Plant Corporation and are operated by the different companies whose names they bear. It will be interesting to see which of these plants will continue to be operated after the war and which of the various processes used will manage to survive the highly-competitive period which is sure to follow.

As each of the various processes of magnesium manufacture is now represented by at least one sizeable, well-equipped plant it is hoped that one of each type will continue to operate in peace time to determine the merits of each process.

Most of these plants ship all or part of the magnesium metal they produce in the form of either pure or alloyed ingots to be processed elsewhere. None of them have finished casting plants. The operations at Austin, Painesville, Velasco, Marysville, Midland, Las Vegas and Lake Charles have plants in which all or part of their output can be alloyed.

Raw-Material Sources The chief interest of nonmetallic-minerals producers in the magnesium industry and its postwar potentialities lies in the fact that all the raw materials used in the various methods of magnesium manufacture are of nonmetallic origin. They include dolomite, oyster shell, magnesite, sea water, various salt-well brines, waste liquors from alkali and potash plants, and silica in the form of ferrosilicon. These materials are used singly or in combination.

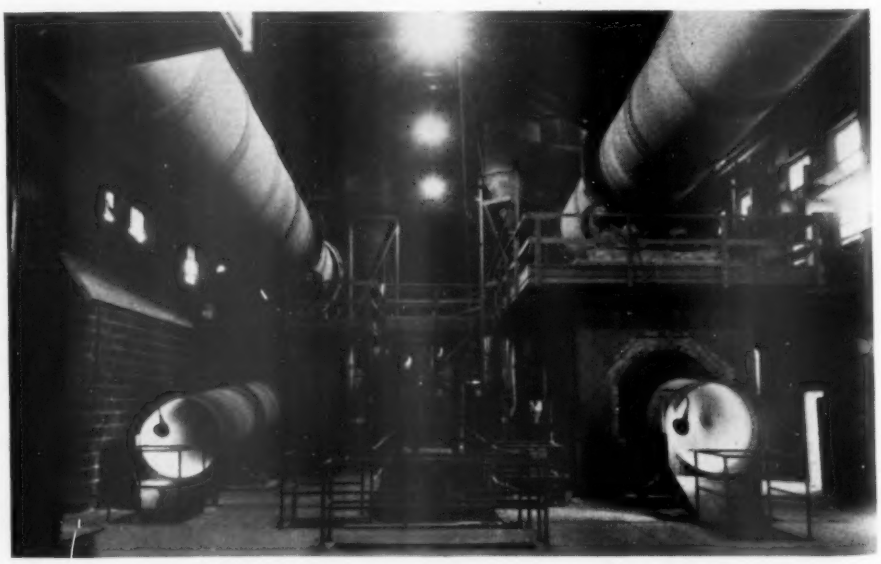
The Dow plant at Ludington gets all its magnesium chloride from salt-well brine and part of its magnesium from dolomite and part from the brine.

The Dow plants at Freeport and Velasco get all their magnesium chloride from sea water, their chlorine from salt, and their lime from oyster shells.

The International plant at Austin gets part of its magnesium chloride

MAGNESIUM PLANTS IN OPERATION IN THE UNITED STATES AND CANADA IN 1944

Plant	Location	Annual Capacity (*pounds*)	Cost	Ownership
Basic Magnesium, Inc.	Gabbs Valley and Las Vegas, Nev.	112,000,000		D.P.C.
Dow Magnesium Corp.	Velasco, Tex.	72,000,000	$52,000,000	D.P.C.
Dow Magnesium Corp.	Ludington and Marysville, Mich.	72,000,000	40,000,000	D.P.C.
Dow Chemical Co.	Freeport, Tex.	54,000,000	36,000,000	½ Dow ½ D.P.C.
Mathieson Alkali Works, Inc.	Lake Charles, La.	54,000,000		D.P.C.
Permanente Metals Corp.	Permanente, Cal.	48,000,000	66,000,000	Permanente
Electrometallurgical Co.	Spokane, Wash.	48,000,000		D.P.C.
Diamond Alkali Co.	Painesville, O.	36,000,000		D.P.C.
Permanente Metals Corp.	Manteca, Cal.	25,000,000		D.P.C.
International Minerals & Chemical Corp.	Austin, Tex.	24,000,000	18,000,000	D.P.C.
Ford Motor Co.	Dearborn, Mich.	20,000,000		D.P.C.
New England Lime Co.	Canaan, Conn.	10,000,000		D.P.C.
Amco Magnesium Corp.	Wingdale, N. Y.	10,000,000		D.P.C.
Magnesium Reduction Co.	Luckey, O.	10,000,000		D.P.C.
Dow Chemical Co.	Midland, Mich.	18,000,000		Dow
Dominion Magnesium, Ltd.	Haley's Station, Ont., Can.	10,000,000		
		623,000,000		



Kilns and coolers in calcining building (Nelco, Canaan).

from waste magnesium chloride liquor from its potash plant and part from dolomite.

The Diamond and Mathieson plants get all their chlorine from waste calcium-chloride liquor from their alkali plants and their magnesia from dolomite.

The Basic plant gets its chlorine from salt and its magnesia from magnesite.

The Hansgirg plant at Permanente gets its magnesia from dolomite and sea water.

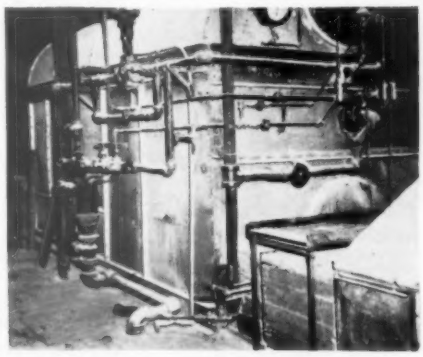
All the other plants use ferrosilicon and dolomite. Large quantities of silica are used in the manufacture of the ferrosilicon which in most cases is done by separate companies.

Methods of Manufacture There are at present two general methods of producing magnesium metal: (1) the electrolytic method, and (2) the thermal-reduction method. The electrolytic method recovers the metal by electrolyzing molten magnesium chloride. The thermal-reduction method recovers it from magnesium oxide. The electrolytic method is the original and best-established method by which most of the magnesium has thus far been made. It represents, so far as is known, 100 per cent. of German production, 90 per cent. of British production, and 83.5 per cent of United States production.

High-side roller mill in calcining building (Nelco, Canaan).

Electrolytic Methods There are two processes of making "cell feed" for the various "electrolytic" methods in use: the wet method and the dry method. All these electrolytic methods use anhydrous magnesium chloride.

In the wet method magnesium chloride is separated from an aqueous solution by crystallization. The product of crystallization is the hexahydrate $MgCl_2.6H_2O$ which has to be converted into anhydrous $MgCl_2$ for use in the electrolytic cells. This is the method which, with minor variations, is used in the Dow plant at Midland.

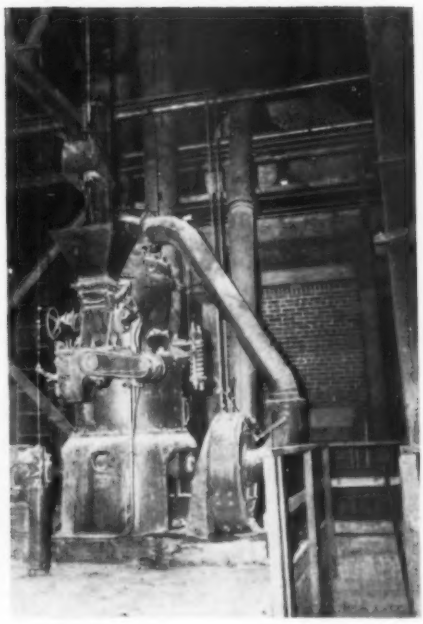


One of the two waste-heat boilers at top of calcining building (Nelco, Canaan).

In the dry method $MgCl_2$ is made by treating magnesium oxide with chlorine and carbon monoxide, a reaction which yields anhydrous chloride and carbon dioxide. This is the method used by Basic Magnesium, Inc. and, in a modified way, by Mathieson.

From 12 to 15 kilowatt-hours of electricity is required for the production of a pound of magnesium metal by electrolytic methods and it is a major item in the manufacturing cost. For this reason all the electrolytic plants are located where an abundance of cheap power is available. Other major requirements are the availability of raw materials at a reasonable cost, the production of a magesium chloride of reasonably good purity and markets for by-products such as bromine, caustic soda, hydrochloric acid, chlorine, etc.

Thermal-Reduction Methods The thermal-reduction methods now known also fall into two groups: (1) those in which the reducing agent oxidizes into a gas, and (2) those in which it oxidizes into a solid product. The reducing agent in the first group is some form of carbon and the process is known as the carbothermic method. The reducing agents preferred in the second group are ferrosilicon, ferro-silico-alumina, aluminum and calcium carbide and this is known as the ferrosilicon or metallic-reduction method.



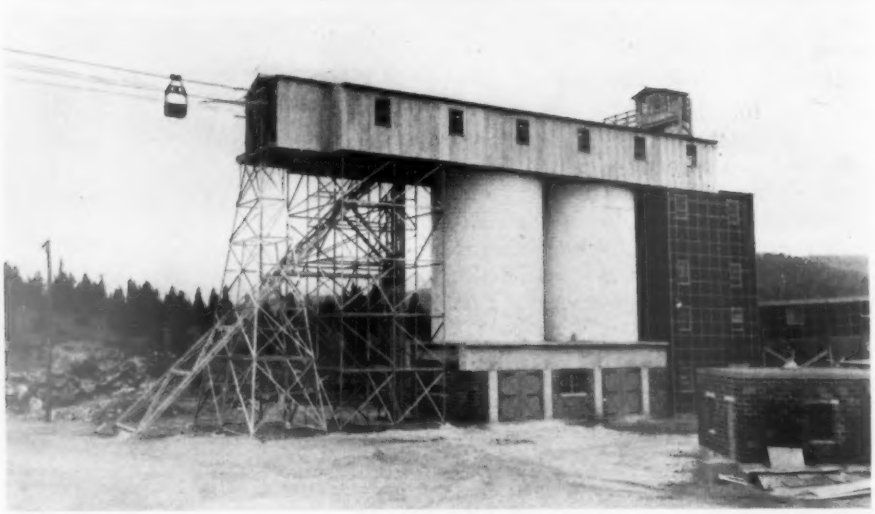
Bowl mill which fires one of the two kilns (Nelco, Canaan).

Carbothermic Method The only carbothermic method now in use is the electro-thermic method using carbon as the reducing agent. This is known as the Hansgirg method.[1] Its chemical reaction is simple: $Mg\,O + Mg + CO$, but its technical application is extremely difficult and its operation is extremely hazardous due to the explosiveness of the metallic magnesium powder and the gas used to provide a condensing atmosphere.

The only plant now known to be using this method is that of the Permanente Chemical Corporation near Los Altos, California. A small plant was erected in Korea by the Japanese but is not known to be in operation. A small plant in England is said to be using a modification of the Hansgirg process.

Ferrosilicon Method The ferrosilicon method of thermal reduction is simpler to operate than the carbothermic method. The chemical reaction, written in simplified form with silicon as the reducing agent, is: $2\,Mg\,O + Si = Si\,O_2 + 2\,Mg$. The product of oxidation remains in the furnace in the solid phase and the nesium-metal vapor. In this and in only gas phase generated is the magthe carbothermic method the power costs require that the magnesia base should be quite pure, and a lime content of less than the equivalent of 3

[1] [For more details on the Hansgirg method see Singewald (Joseph T., Jr.), *Magnesia Sources and the Magnesium-Metal Problem*, PIT AND QUARRY, August, 1942, pages 45-50. —ED.]



Terminus of tramway at gallery above concrete-stave silos (Amco).

per cent. on a carbonate or magnesite base is required.

Pidgeon Process A modification of the ferrosilicon method now in use is known as the Pidgeon process after Dr. L. M.

Crusher building and skip for loading tramway (Amco).

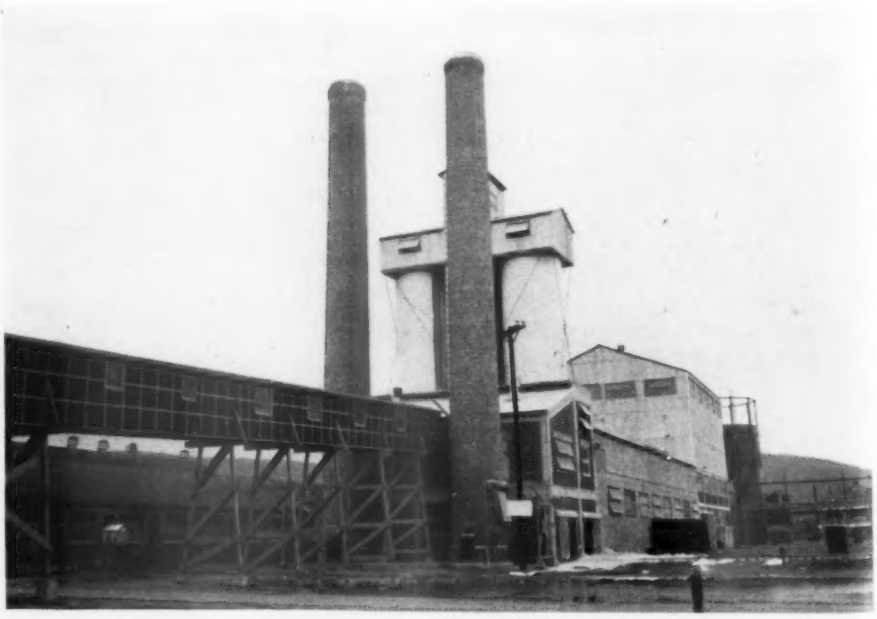
Pidgeon, a Canadian who perfected it for commercial production, although it had been used in European laboratories for some years. This process requires neither a high-magnesia base nor a large electric-power supply and was designed to meet conditions prevailing in Canada. In the Pidgeon process the magnesia raw material, preferably dolomitic lime, is charged with ferrosilicon in an externally heated vacuum retort and the magnesium is distilled into a condenser. The reaction written in simplified form using dolomite and silica is: $2CaO.MgO + Si = 2CaO.SiO_2 + 2Mg$. With ferrosilicon the solid residue contains calcium silicate, metallic iron and a small amount of calcium ferrite.

After extensive investigations a pilot plant was built in 1941 by the newly-formed Dominion Magnesium, Ltd. This proved to be so successful that a plant was built at Haley's Station, Ontario, and went into operation in August, 1942. This was the first of five nearly-identical Pidgeon-process plants which were built on this continent and which differ only in minor details of the preparation and handling of the dolomite and ferrosilicon and in the heating of the retorts. In the Canadian plant electric globar heating is used; in the other plants gas is the fuel. The second plant, that of the New England Lime Company at Canaan, Connecticut, poured its first ingot in August, 1942, that of the American Metals Corporation in April, 1943, and that of the Magnesium Reduction Company at Luckey, Ohio in January, 1943. All these plants were designed by the firm of Singmaster & Breyer, New York, which also designed the furnace room layout and the retort furnaces used in the Dominion plant. Each of these plants has a capacity of 15 tons of magnesium metal daily in 24-hour operation or 10,000,000 pounds annually. All are equipped for alloying the metal which is shipped in ingots to various processes.

There are two other magnesium plants which also use the Pidgeon

One of the presses which makes briquettes for furnace retorts (Amco).

process but which were designed separately. One of these, that of the Ford Motor Company at Dearborn, Michigan, has been in operation over two years. Two 10- by 150-foot rotary kilns and two 8- by 60-foot rotary coolers in the company's cement plant are used to burn and cool the dolomite. A bucket-conveyor carries the lump lime to the finish-grinding department of the cement plant where it is fed, with

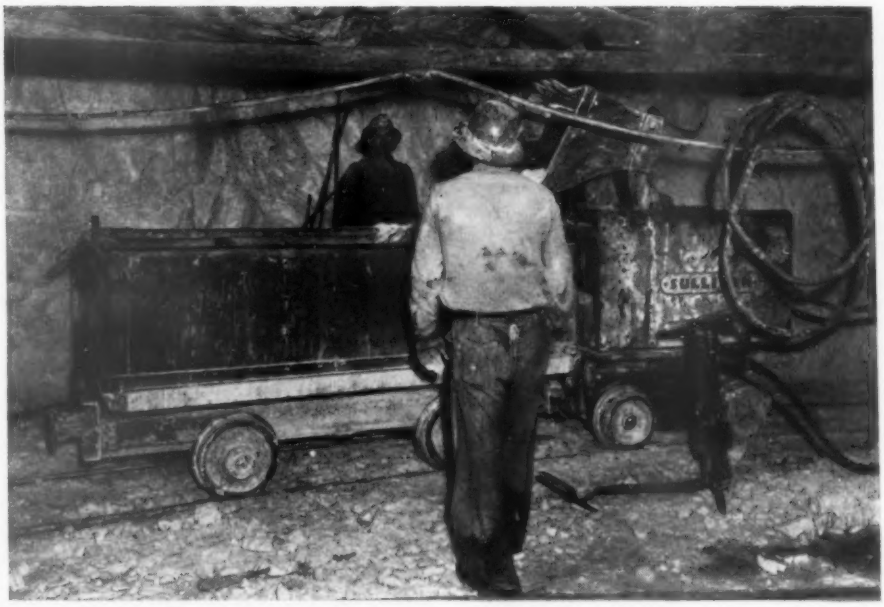


Kiln building with conveyor from tramway silos at left (Amco).

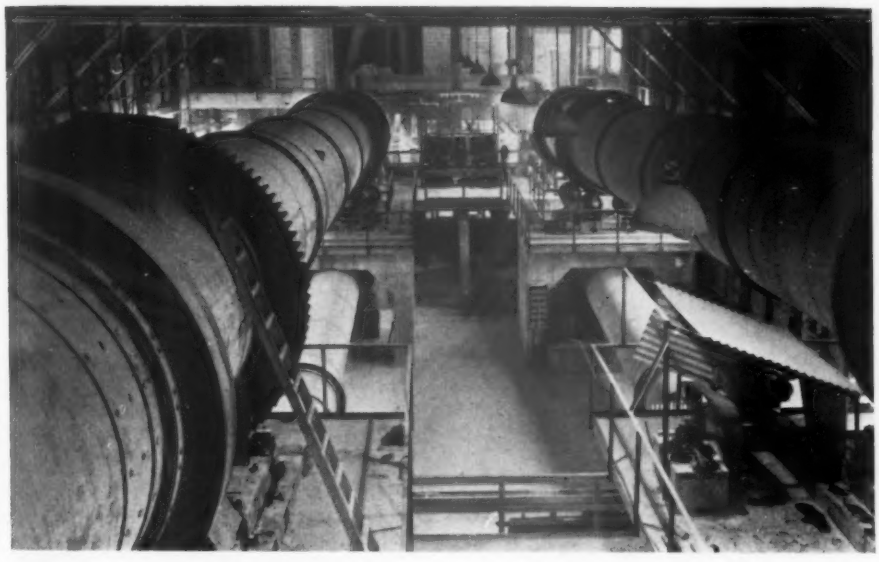
75 per cent. ferrosilicon at a ratio of about 6 to 1, to the mills which perform the dual function of mixing and grinding these materials. The furnaces used in this plant are of special construction, having alloy-steel retorts lying in a bath of sodium silicate and receiving much of their heat through this "gloss bath." Each of the retorts produces 70 pounds of magnesium in 8 hours.

The other Pidgeon plant is operated by the Permanente Chemical Corporation at Manteca, California. The general layout of this plant differs little from that of the other Pidgeon plants. It is located 75 miles from the quarry and lime-burning plant at Natividad.

The Electro-Metallurgical Company at Spokane, Washington, uses a process similar to that in the plant of International Alloys, Ltd., at Cardiff, Wales. The retorts used in this



Loader mucking stone into mine cars in one of tunnels (Amco).



The two 8- by 125-foot rotary kilns with coolers below (Amco).

plant are larger than those used in the Pidgeon plants and stand vertically with their condensors beneath them. They are heated by electric resistor ribbons.

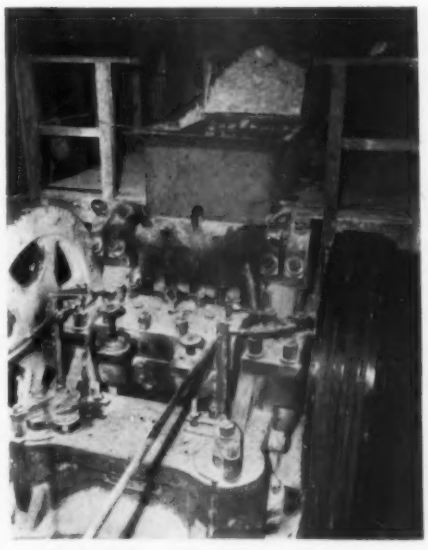
New England Lime Company The magnesium plant of the New England Lime Company is at Canaan, Connecticut, where the Company has a vertical-kiln dolomitic lime plant. To supply its needs an old quarry which had not been used for many years was reopened. This supplies a high-grade dolomite which is low in sodium and potassium. A typical analysis follows:

MgO	21.7 per cent.
CaO	30.2 per cent.
Fe_2O_3 and Al_2O_3	0.4 per cent.
SiO_2 and insolubles	0.5 per cent.
Loss on ignition	47.2 per cent.

This rock is quarried and crushed at a commercial plant of the lime company and is hauled in trucks a distance of ½ mile to the magnesium plant. There the secondary reduction is done by a Number 5 Allis-Chalmers McCully gyratory crusher. A bucket elevator feeds the rock on a 4- by 12- foot Tyler Ty-Rock 2-deck screen which is equipped with ½-inch and 6-mesh cloth. The material passing over both decks goes to a Bonnot hammer-mill from which it goes back to the elevator in a closed circuit. The minus-6-mesh material which falls through the bottom deck of the screen is carried by an elevator and a screw-conveyor to a 1,500-ton storage bin. It is also possible to discharge the stone from the screw-conveyor through a spout into trucks for haulage to the company's lime plants. This department has a capacity of 60 tons per hour.

From the storage bin the stone is reclaimed through five gates by a 16-inch by 100-foot tunnel belt-conveyor from which it is elevated to the kiln-feed bin. Two Bartlett & Snow reciprocating feeders measure the stone to short belt-conveyors which feed the two Vulcan rotary kilns through 4-inch pipes. One kiln is 7 by 120 feet and the other 6 by 100 feet in size and they discharge into Vulcan 4- by 40-foot and 4- by 28-foot rotary coolers respectively.

Both kilns are fired with pulverized coal by Number 312 Raymond direct-firing bowl mills which obtain their drying air from the kiln hoods through cyclones. The primary reduction of the coal is accomplished by a Stephens-Adamson Knittle ring crusher. All the necessary instru-



Primary crusher at quarry (Amco).

ments for complete automatic kiln control were not available when this plant was built but they may be installed later.

Each kiln has a 10- by 20- foot fire-brick dust chamber with a dividing curtain wall under which the gases must pass to the kiln stacks. The dust collected in these chambers is discharged through chutes to drag-chain conveyors and elevators which carry it to a bin from which trucks haul it away to waste. The 1200-1400-degree F. exhaust gases can, if desired, be diverted into two new E. Keeler Company waste-heat boilers rated at 215 and 146 horsepower, respectively. These are supplemented by a 146-horsepower auxiliary boiler.

Oyster shells being fed by crane to dual hoppers of conveyor system leading to plant (Dow, Velasco).

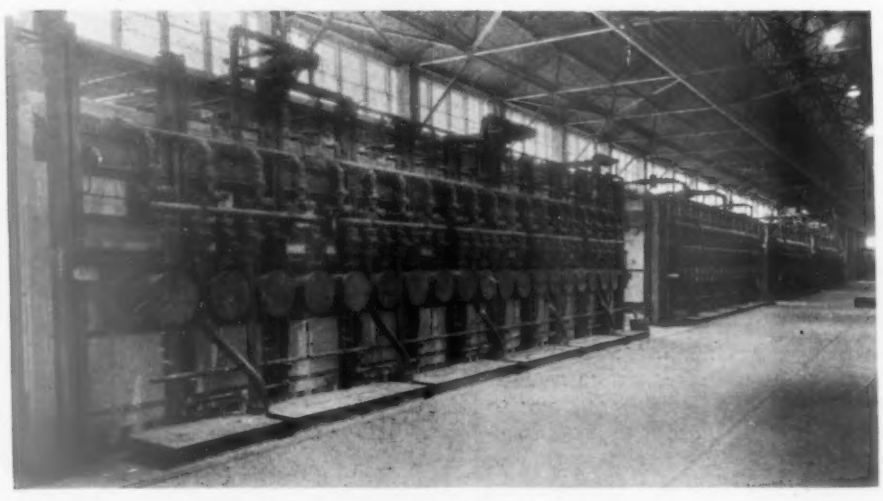
These boilers have Buffalo draft fans which vent to stacks. The large kiln and the auxiliary boiler are connected to 100-foot Custodis radial brick stacks. The small kiln has a steel stack. When the waste-heat boilers are not in use the kilns operate on natural draft. The steam produced is used for heating and in the process.

Looking down on the three rotary kilns (Dow, Velasco).

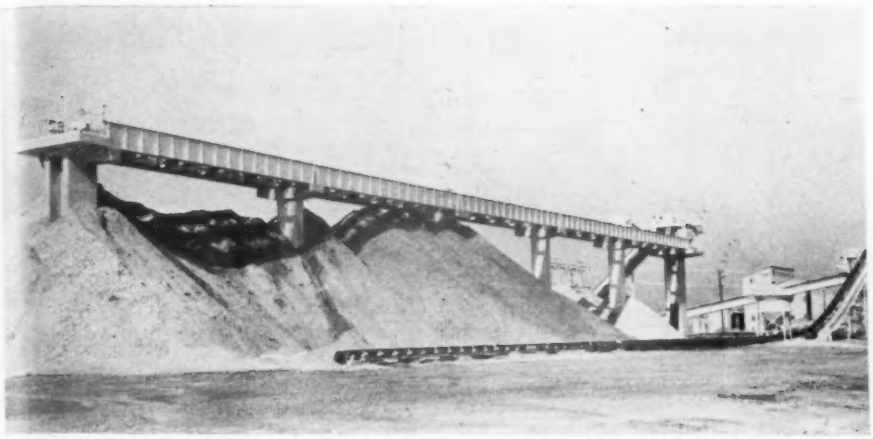
The lime from the coolers is carried by a series of screw-conveyors and elevators to three bins, one of which can be used to load lime for shipment or for the disposal of rejected lime. The lime is fed from the other two bins to a pair of Raymond 5-roller high-side mills which are equipped with double whizzers and are in circuit with 8-foot cyclones and Number 20 Dracco bag - type dust-collectors. The minus 60-mesh quick-lime produced is discharged through double gates into the center compartment of a 3-compartment bin.

A second compartment is used for crushed ferrosilicon. This is received in railroad cars in slab size and under and is reduced by a 10- by 24-inch Allis-Chalmers jaw crusher before it is elevated into storage. This minus ⅜-inch material is then fed by a Hardinge constant-weight feeder into a 36-inch by 6-foot Hardinge air-swept conical mill equipped with a loop classifying system. The coarse material from the classifier is returned to the mill. The fines pass through a cyclone and a Pangborn collector, from which the 95-per cent.-through-200-mesh product is carried by a screw-conveyor to the third bin compartment. This system has a capacity of about 1 ton per hour.

The pulverized lime and ferrosilicon are discharged in sequence through screw-conveyor feeders from their bin compartments into a Read Machinery Company batch weigher. This is equipped with a 2-beam scale and mercoid cut-off gates. The batcher is mounted on rails over four Lancaster pan-type, muller-roll vertical-shaft mixers. The blended mixture, consisting of about 86 per cent. lime and 14 per cent. ferrosilicon by weight, goes to a Redler conveyor from which it is discharged into a 6- by 20-foot Hardinge rod-mill for the removal of excess air and agglomeration to densify the mixture and improve the briquette quality. The mixture is discharged either from the mill or the Redler conveyor to a screw-conveyor which carries it



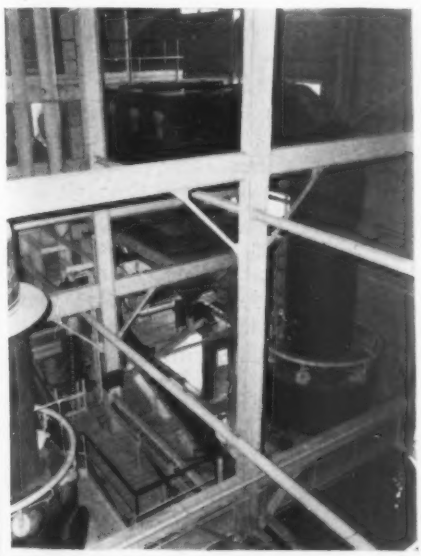
Metallic-magnesium retort furnaces at Luckey, Ohio plant, Magnesium Reduction Company.



Shell storage and reclaiming system (Dow, Freeport).

underground to a bucket-elevator in the furnace building.

The two belt-conveyors feeding the briquetting machine hoppers have Stearns magnetic head pulleys to remove from the nonmagnetic mixture any tramp iron which might damage the rolls of the two Komarek & Greaves Belgian roll-type briquette presses. A third press has been installed since the plant was built. A thin film of oil on the rolls helps to release the briquettes, but no binder



Dust-collectors and gas scrubbers in kiln-feed building (Dow, Ludington).

of any kind is used in the mixture. The briquettes are carried by belt-conveyors to rotary screens from which the dust and broken pieces are returned by screw-conveyors to the elevator ahead of the presses. The whole briquettes are discharged on a chute from which they are loaded into paper bags for the furnaces.

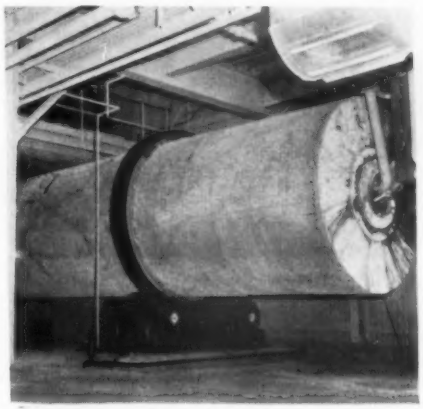
There are 20 furnaces with 20 retorts each, the same as in the Wingdale and Luckey plants. In this plant Coal Carbonizing Company Curran-Knowles furnaces adapted from coking furnaces are used.

Each retort is run under very high heat and high vacuum, magnesium vapor being distilled off in the hot section and condensed in a condensing or cooler section of the retort which is outside the furnace wall. At the end of the retorting cycle, which may be anywhere from 8 to 12 hours, the retort is opened and the magnesium metal removed in a sleeve which had been previously placed in the condensing section after the retort had been charged. The small amount of sodium which may be present is condensed on a special sodium condenser which is in the cooler section of the retort.

After the reaction cycle the metal is removed and the spent briquettes are raked out to waste hoppers. The waste material contains a large percentage of dicalcium silicate. Several uses are being investigated for this refuse material. The magnesium metal is removed from the condenser sleeves in a metal press, the magnesium crowns or muffs are then sent to the melting and alloying department where they are melted down for coating into various forms of ingots or billets. During the melting operation alloy ingredients may be added to the melt to produce the various commercial alloy ingots.

Amco Magnesium Corporation

The deposit from which the stone for the Wingdale, New York, plant of the Amco Magnesium Corporation is obtained is located about 2 miles east of the plant. It was originally a marble quarry from which came the stone for many historic buildings in the East. The two original open

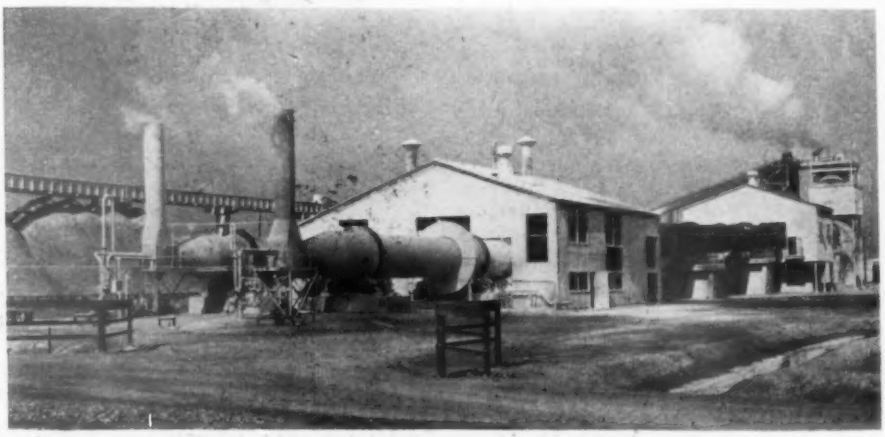


One of the two 8- by 52-foot rotary slakers (Dow, Ludington).

quarries are several hundred feet deep and are full of water. At present rock is being removed around the edges of these holes and a 100-foot tunnel has been excavated through the intervening ridges. Some glory holing is now being done to develop a new open quarry beyond the old ones. The supply of rock here is nearly inexhaustible.

This rock is a crystalline marbleized dolomite with an analysis which is practically the theoretical composition of dolomite. A typical analysis follows:

MgO	21.44 per cent.
CaO	30.73 per cent.
Fe_2O_3	0.23 per cent.
Al_2O_3	0.23 per cent.
SiO_2	0.55 per cent.
Loss on ignition	46.59 per cent.



Kilns and slakers utilizing oyster shells (Dow, Freeport).

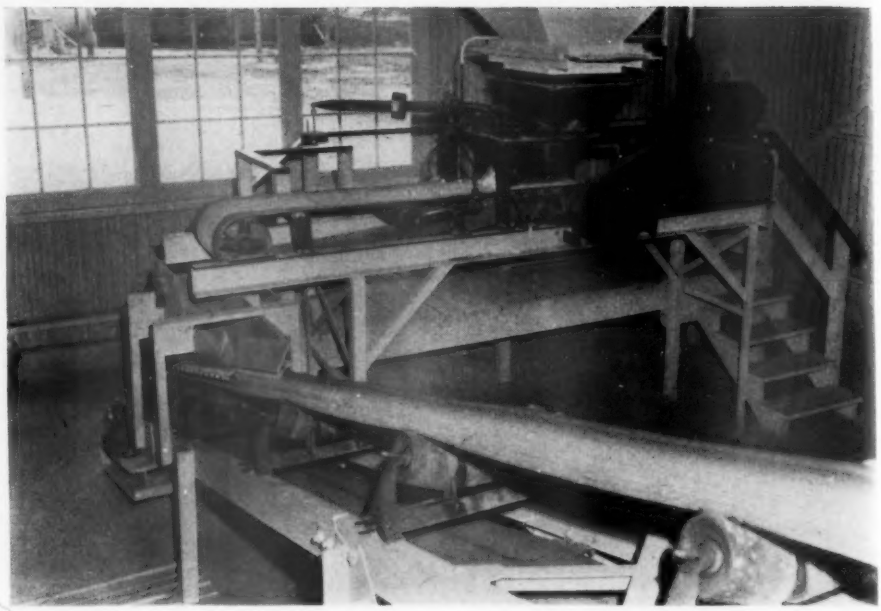
All the drilling is being done with jackhammers for which the air is supplied by a 1,200-c.f.m. Ingersoll-Rand compressor. In the tunnels the mucking is being done by a Sullivan mine loader. A ½-cubic yard shovel will be used in the open quarry. The stone is loaded into 40-cubic foot mine cars which are hauled in trains of four cars each to the crushing plant, a distance of 400 feet, by a Mancha 1½-ton electric storage-battery locomotive.

The rock is dumped from the cars by a pneumatic car dumper into a track hopper. A Bartlett & Snow skip-hoist with a 6-ton bucket discharges the rock into a hopper in the crushing building from which a plate feeder discharges it over a grizzly into the 18- by 36-inch Kennedy-Van Saun primary jaw crusher. The minus-4-inch grizzly and crusher throughs are carried by a belt-bucket elevator into a 150-ton Marietta concrete-stave storage silo.

Batch weigher which feeds coal to direct-firing kiln mill (Dow, Ludington).

This silo is the loading terminal for the aerial tramway which carries the rock to the magnesium plant. This tramway is 9,500 feet long and in this distance crosses hills, highways and a 1,320-foot span across a river but its discharge terminal is only 50 feet lower in elevation than its loading terminal. It has 10-cubic foot buckets and its capacity is 40 tons per hour. It is driven by a 25-horsepower motor. The tramway has a 1¼-inch load line, a ⅞-inch return track cable and a ⅝-inch traction cable. It was originally a Riblett cableway which had been used in a metal mine in New Mexico but was rebuilt by the American Steel & Wire Company..

The rock is discharged at the magnesium plant into two 350-ton



Weighing device which feeds stone to conveyor serving one of the kilns (Dow, Ludington).

Marietta concrete-stave storage silos. Apron feeders reclaim the rock on a belt-conveyor from which a bucket-elevator moves it to a 4- by 12-foot Kennedy-Van Saun 2-deck screen with ⅜-inch openings. The oversize goes into a No. 25½ Kennedy-Van Saun gearless gyratory crusher from which it goes back to the elevator ahead of the screen.

The minus-⅜-inch rock from the screen is carried on a long belt-conveyor to the calcining building where a bucket-elevator feeds it to a General Engineering Company sampler. A pair of 16-inch screw-conveyors discharges the rock into two 150-ton Marietta silos. Bartlett-Snow reciprocating plate feeders discharge the stone from the silos through spouts into the two 8- by 125-foot Vulcan rotary kilns. Below these are two 4- by 50-foot Worthington rotary coolers.

The kilns are fully instrumented, having Leeds-Northrup optical pyrometers and recorders, Askania automatic gas-air ratio and draft controls, gas-pressure recorders, flow meters, draft gages, etc.

The kilns are fired with hot gas supplied by Wellman Galusha gas producers using anthracite coal. The gas burners and controls were supplied by the Bloom Engineering Company. The primary air is drawn through cyclones from the coolers by a fan which is vented through the roof for the disposal of any excess air. The kilns have Vulcan seal rings—T-type at the hoods and ring-type at their feed ends. The kiln dust chambers are of 2-compartment brick construction, similar to those

Tractor with air-conditioned cab pulling 15-cubic yard scraper under stone bin (Dow, Ludington).

at the New England Lime plant, and have hopper bottoms from which the dust is discharged into a mine car for disposal. Two 100-foot M. W. Kellogg radial brick stacks supply natural draft for the kilns.

The lump lime from the coolers is carried by a series of screw and belt conveyors and bucket-elevators to two of three Marietta silos of 150 tons capacity each. The third silo is used for rejects. From these bins the lime is fed to a pair of Raymond high-side mills similar to those in the New England Lime plant at Canaan. These circuits have Pangborn cyclone dust-collectors.

Ferrosilicon is also received and crushed in the same manner as at Canaan. An Allis-Chalmers jaw crusher and an Allis-Chalmers 4- by 6-foot ball-mill with a Raymond 8-foot single-whizzer separator are used. The fine ferrosilicon is elevated into one of three 75-ton Marietta silos; the others are used for pulverized lime.

The lime and ferrosilicon are blended and mixed as they are in the Canaan plant except that the agglomerating can be done by a 6- by 12-foot Hardinge rod-mill. A Read batcher and four Lancaster muller-type mixers are used.

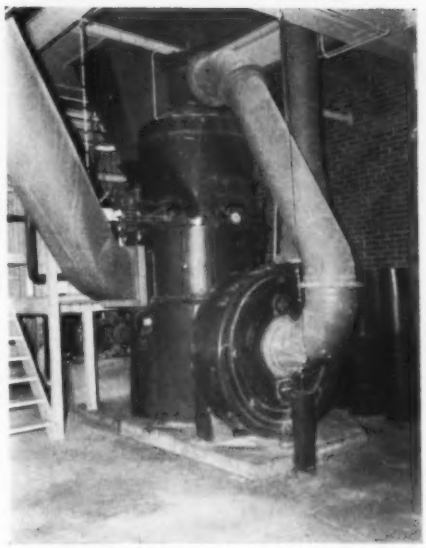
Also in the furnace building are three Komarek & Greaves briquette presses. Ahead of each is a Jeffrey-Traylor electric vibrating feeder with a screen which removes iron and other foreign matter ahead of the presses. The finished briquettes are discharged from the presses over bar grizzlies which remove dust and broken pieces. Belt-conveyors feed the briquettes to revolving screens for further cleaning before they are loaded into paper bags for charging into the retorts.

The dust from the briquettes is always returned to the presses. In this plant provisions are also made for rebriquetting when this is desirable. In this case the briquettes are fed to a roll crusher and back to the elevator ahead of the presses. Most of the conveyors and elevators used in this plant were supplied by the Conveyor Company.

The 20 furnaces in this plant have 20 retorts each and are identical in design and operation with those in the Canaan and Luckey plants. Both pure and alloyed ingots are cast in this plant and at Canaan.

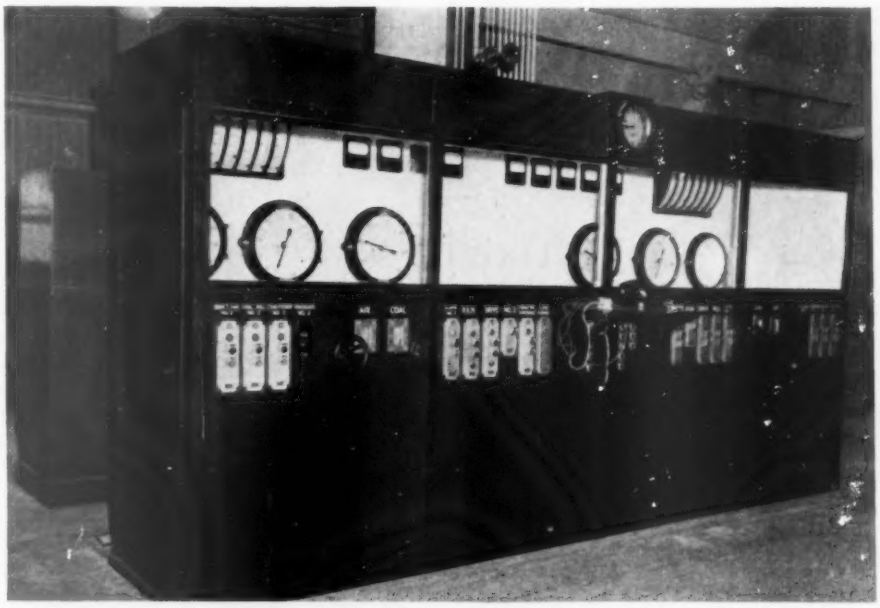
Magnesium Reduction Company At the Luckey, Ohio, magnesium plant of the Magnesium Reduction Company the minus-16-mesh quicklime for use in the process is purchased from the Luckey lime plant of the National Gypsum Company. The lime is delivered in trucks or railroad cars to a hopper from which a bucket-elevator and screw-conveyors distribute it into four Neff & Fry concrete-stave storage silos. Two series of drag-chains and screw-conveyors and bucket-elevators feed the lime to either or both of two Raymond high-side roller mills. These are identical with the installations in the other plants and have cyclones and collectors. The pulverized lime goes into two Neff & Fry silos.

The ferrosilicon is received in railroad cars and is first reduced by a jaw crusher. The final grinding is done by a Hardinge conical mill, which is not air-swept like the one at Canaan but is in closed circuit with a 65-mesh Tyler Hum-mer screen.



One of the two direct-firing coal mills which fire kilns (Dow, Ludington).

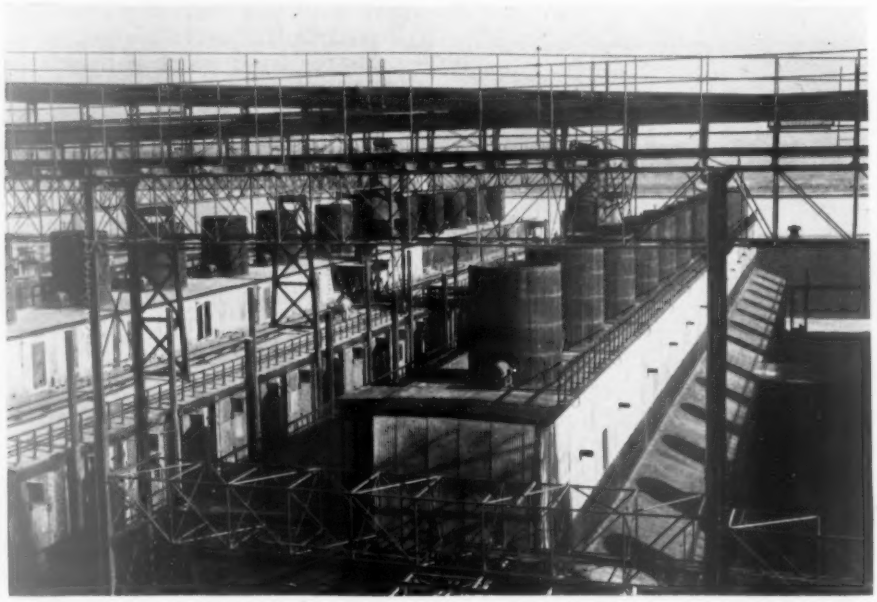
This view shows the two 320-foot lime kilns as seen from their feed ends. Coal-mill building and thickener visible in background (Dow, Ludington).



Control board for one of the two kilns containing recording pyrometers and other instruments (Dow, Ludington).

Screw conveyors feed the pulverized lime from the silos to a fixed weigh-batcher under the pulverized ferrosilicon silo and a Day ribbon-type mixer is used. Provisions are made in this plant for agglomerating the mixture in a 7- by 24-foot Smidth tube-mill. It is then carried by screw-conveyors and bucket-elevators to the furnace building. The briquetting is done in two stages and there is no provision for preheating the briquettes. Each of the 20 furnaces in this plant has 20 retorts and is gas-fired. The furnaces were designed jointly by the Surface Combustion Corporation and the National Lead Company. The residue removed from the retorts drops from the discharging screw into fixed hoppers at the floor line. The entire output of this plant is alloyed and cast into ingots.

Metallic magnesium being ladled into ingot molds from the electrolytic cells.



This view in one of Dow's Texas plants shows some of the electrolytic-cell buildings in which metallic magnesium is made.

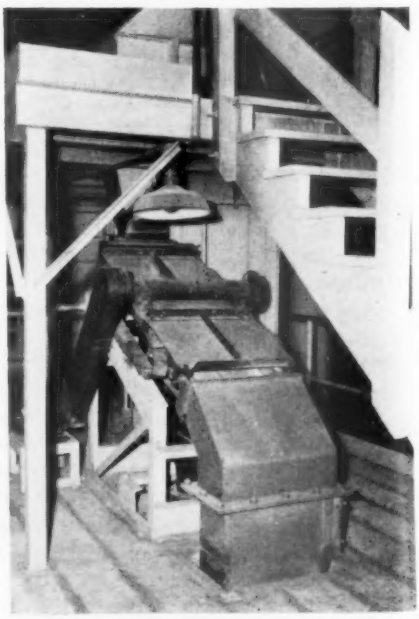
Dominion Magnesium Ltd. The plant of Dominion Magnesium, Ltd., gets its rock from a deposit which closely approximates the theoretical analysis of dolomite and which contains less than 1 per cent. of insoluble material. The drilling is done in two 20-foot benches with an Ingersoll-Rand wagon drill for which air is provided by a compressor of the same make. The broken stone is loaded by a shovel into trucks which haul it to a 28- by 36-inch Traylor jaw crusher which reduces it to 4-inch size and under. A 4-mesh Tyler Ty-Rock screen discharges the coarse rock into a Bonnot hammer-mill and the 4-mesh fines from this and the screen are elevated to a Raymond separator which removes minus-100-mesh material.

Of the two Vulcan rotary kilns in this plant only one is actually in use. The coal used as fuel is prepared by a Raymond direct-firing bowl mill. Following each kiln is a Vulcan rotary cooler. A Raymond roller-mill in closed circuit with a classifier grinds the lime, which is then stored in bins to be mixed with the ferrosilicon.

The ferrosilicon is purchased in large chunks which are broken down by a jaw crusher and further reduced in a 4- by 4-foot ball-mill which operates in closed circuit with a Hum-mer screen.

The lime and ferrosilicon are batched into a mixer and then fed into the Komarek & Greaves briquetting machines. The briquettes are screened and the fines returned to the machines. The preheating system originally used in this plant has been abandoned and the briquettes are now fed direct to the electrically-heated furnaces, of which there are ten, each with 40 retorts. Oil-fired melting pots are used for melting down the "crowns" from the retorts. Pure ingot as well as alloy ingot is shipped.

Permanente Chemical Corporation Little information has been released about the Permanente Chemical Corporation's operations. The Hansgirg magnesium plant and its ferrosilicon plant are located adjacent to its cement plant at Permanente near Los Altos. The magnesia is supplied by a sea-water plant at Moss Landing, near Watsonville, California. The Pidgeon-process magnesium



Screen which removes fines from kiln-feed stone (Dow, Ludington).

plant is located at Manteca, near Modesto, California, and the high-magnesian lime for it is made from dolomite by a plant at Natividad, which also supplies the high-magnesian lime for the Moss Landing plant.

Electro-metallurgical Corporation Little is known about the magnesium plant of the Electro - metallurgical Corporation, a unit of the Union Carbide & Carbon Corporation, at Mead, near Spokane, Washington. The method employed involves the reduction of dolomite by ferrosilicon and is said to have been developed by engineers of the company. The ferrosilicon is obtained from an adjacent plant. The dolomite is obtained from a deposit near Northport, Washington, which was acquired from the Spokane Portland Cement Company. The availability of Coulee Dam power was an important factor in selecting the location for this plant, which went into operation in September, 1943.

Dow-Type Plants The Dow Chemical Corporation's contribution to the success of the magnesium-production program is too well known to require much additional comment. Dow's role in pioneering the production of this metal has already been described and its importance in the present production picture is evident from the fact that nearly one-third of the potential magnesium-producing capacity lies in plants owned or operated by Dow. In the first ten months of 1943 about 61 per cent. of all the magnesium produced came from Dow plants.

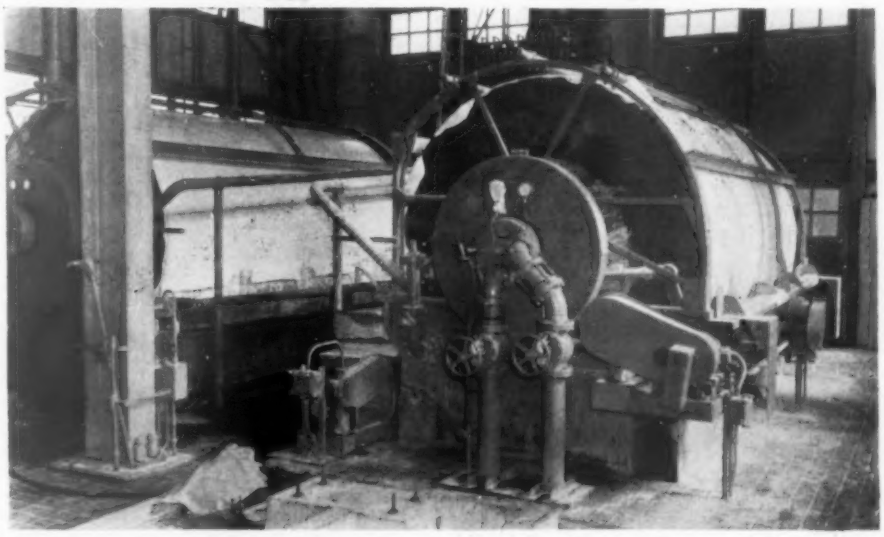
The pioneering and development work done by Dow was also important in the design of some of the other plants using similar processes. The Painesville and Ludington plants operate on a system which was first developed by Dow and involves the reaction on magnesium hydrate of calcium chloride. The Freeport and Velasco plants differ from these plants chiefly in the fact that oyster shells are used instead of dolomite and sea water instead of brine or calcium-chloride liquor. The Painesville, Ludington and Lake Charles plants all deal with a base-exchange reaction in which calcium chloride and the magnesium hydrate from the slaking process with the aid of CO_2 form $MgCl_2$ and calcium carbonate. In the Austin plant there is no base exchange reaction as it involves selective carbonation of the lime and the chloride is introduced by selectively neutralizing the magnesium hydrate with hydrochloric acid to form a magnesium-chloride solution. This leaves calcium carbonate as a solid in suspension.

All these plants have sources of magnesium and chlorine as make-up. They also have a common starting point in the use of magnesium-chloride as the cell feed. They all use the shelf driers first developed by Dow, as well as cells and other metal-recovery and by-product systems of Dow design. They are similar in some ways from the point where they obtain a 35-per cent. magnesium-chloride liquor and are identical from the cell feed on. Most of these plants re-use the chlorine gas generated in the cells in the process but at Lake Charles it is sold.

Firing end of lime kiln where the burned stone drops into the slaker (Dow, Ludington).

All the Dow plants were designed by the Dow Chemical Company, with detailed engineering and construction done by the Austin Company. In their construction every effort was made to save vital materials. Wood, concrete and brick have been used wherever possible instead of steel. In the cell buildings, because of the large amounts of electricity used, brick walls and wooden beams, columns and floors are used as they are poor conductors and lessen the danger of accidental grounds. Transite cement-asbestos pipes and chemical-bearing pipes of Saran, a Dow plastic product, are used wherever possible instead of rubber and

A view of the crusher building and stock-piling boom conveyor from track house (International, Austin).

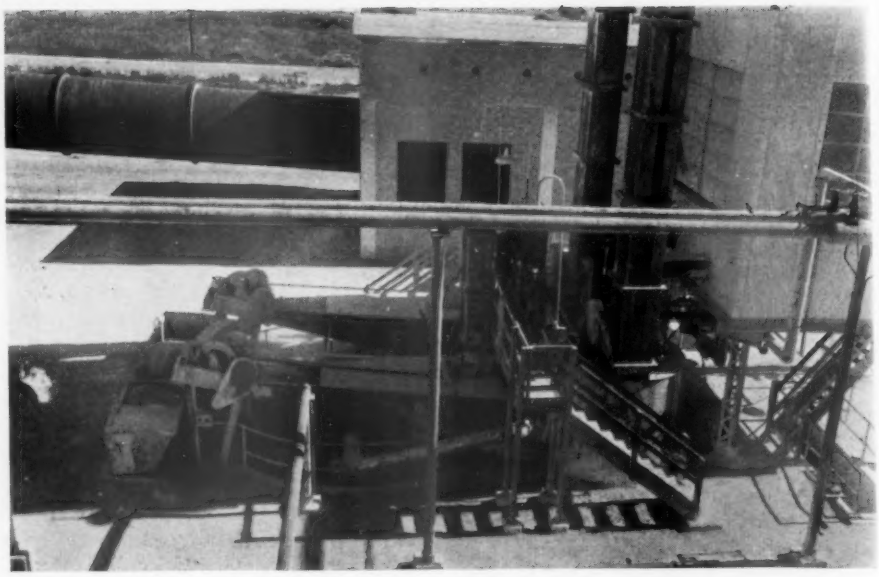


Two panel-type filters from which calcium-carbonate cake is wasted (International, Austin).

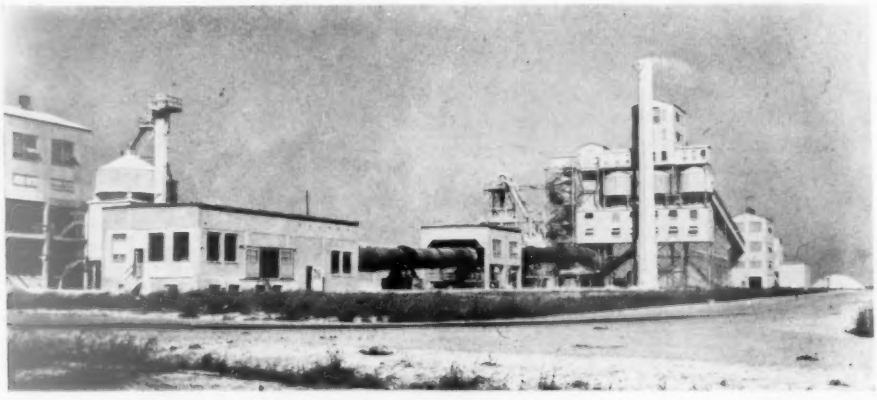
steel. The Marysville plant alone uses 900 tons of silver instead of copper for bus bars to conduct electricity.

Dow's Velasco Plant The oyster shells used in Dow's Velasco plant are dredged from Galveston Bay. The barge-loads of shell are unloaded at the plant dock by two Moore electric crawler Speedcranes with clamshell buckets. These put the shell into hoppers with Allis-Chalmers table-feeders over two Allis-Chalmers revolving washing screens from which the minus-1/16-inch fines go into a Dorr settling tank and the coarse into a pair of Allis-Chalmers double-screw washers. The overflow from all three machines is pumped to the effluent canal by a Gardner-Denver GarDurloy reciprocating pump.

The washed and cleaned shell is carried on a series of Jeffrey belt-conveyors either direct to the kilns or to a 50,000-ton storage pile. A Sauerman Crescent scraper with a movable tail tower mounted on rails is used to move the shell to or from storage.



Turbo-mixer and rake slakers with kiln in background (International, Austin).

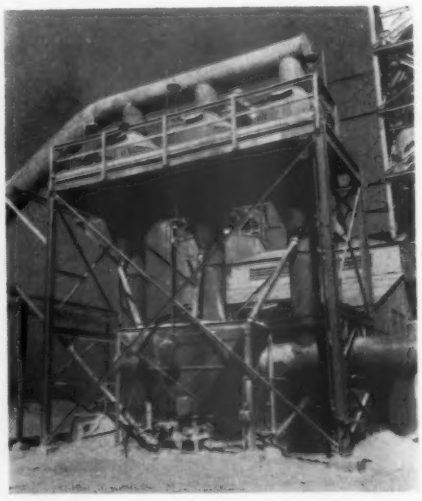


Plant view showing the carbonator building, slaker-feed tank, kiln, crusher building, etc. (International, Austin).

Under each of the three kiln-feed hoppers is a Schaffer weighing-type Poidometer from which the shell is discharged through spouts into the three 8½- by 265-foot Allis-Chalmers rotary kilns. These are fully instrumented and have all the latest automatic features. They are gas-fired, with a burning temperature of 2,700 degrees F. and a fuel consumption of about 9,500 cubic feet of natural gas per ton of lime produced. Each kiln is driven by a 4-speed a.-c. motor and has an auxiliary gasoline-engine drive.

The lump lime is discharged from the kilns into 8- by 52-foot Allis-Chalmers rotary slakers. The milk of lime goes to a pair of 200-foot Dorr thickeners, acting as storage tanks, from which it is pumped into a mixing tank.

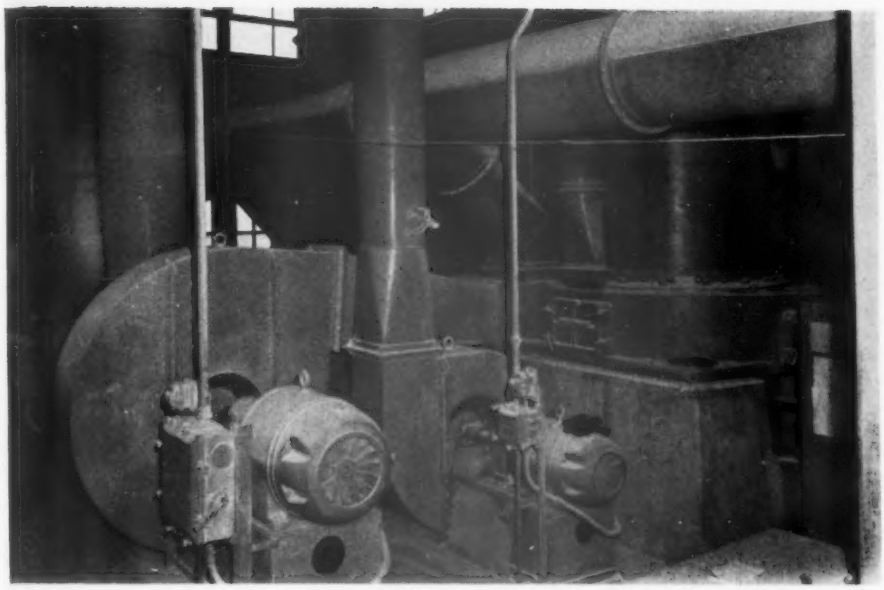
The sea water used in this process contains 1,200 parts per 1,000,000 of magnesium and is pumped from the main channel from the Gulf into an auxiliary canal from which it is pumped into the mixing tank with the milk-of-lime.



Cyclone dust-collector and ducts above through which CO_2 gas goes into process plant. Dust-conveying system below (International, Austin).

From the mixing tank this mixture goes to four Dorr 500-foot diameter thickeners in each of which are four 200-foot rakes. In these the magnesium-hydroxide content is raised to 10 per cent. in the underflow which is pumped to a batch of Moore filters. This is thought to be the largest installation of its kind in existence. These filters increase the magnesium-hydroxide content of the mixture to 20 per cent. before it goes into neutralizers. These are small mixing tanks in which the magnesium hydroxide reacts with hydrochloric acid from another adjacent plant to form a 17-per cent. magnesium-chloride concentration. Next in the process are Ozark evaporators with submerged combustion which double the concentration to 34 per cent.

After going through some more Moore filters which remove salt and some moisture the mixture goes into open boiling kettles with steam-heating coils which produce a sludge with a 50-per cent. concentration. Next are gas-fired shelf-type driers of Dow design in which the liquor is crystallized and dried by the circulation of hot air. These have staggered shelves with reciprocating rakes which move the material progressively downward. The product of the driers is magnesium-chloride cell feed in the form of shot-sized granules containing 25 per cent. water of crystallization. These granules are stored in steel tanks from which they are carried by mechanical conveyors to the cell-house where Dow electrolytic cells convert them into pure magnesium metal. An alloying plant



High-side mills and fans which can be used for pulverizing lime if desired (International, Austin).

is operated in connection but no casting other than of alloy billets is done.

The chlorine released from the cells is used to make the hydrochloric acid which is re-cycled back to the neutralizers. The inevitable acid loss in process is made up by chlorine from the company's plant and the incidental sodium hydroxide produced supplements the lime as a precipitant in the mixing tanks or is shipped as caustic soda.

Dow's Freeport Plant The Dow Chemical Company's plant at Freeport, Texas, has only one-half the capacity of the Velasco plant but otherwise differs from it only in minor details. The raw materials are received from the same sources and are processed in the same manner. In the lime department two Allis-Chalmers rotary kilns and two slakers are used instead of three as at the Velasco plant. The numbers and capacities of other units throughout the plant are in the same proportion. No alloying or casting is done at this plant.

Dow's Ludington and Marysville Plants The Dow Magnesium Corporation's plant at Ludington, Michigan, is equipped to receive rock shipped in boats or cars. Dolomite from sources in four different states has been used but that now used comes from northern Michigan by railway. It has a 12- to 12½-per cent. magnesia content. A channel from Lake Michigan to the plant docks will accommodate large self-unloading lake steamers when these again become available.

The stone is dumped from cars on two tracks into track hoppers. From these it is fed by a flight-conveyor to a bucket-elevator which discharges it on a belt-conveyor. A reversible shuttle belt-conveyor can discharge the stone either into two 400-ton lime-kiln feed bins or through a chute into an outside bin for stock-piling. This stone-handling system has a capacity of 220 tons per hour.

The stock-piling is done by a 15-cubic yard Gar Wood scraper wagon which is drawn by an Allis-Chalmers HD14 Diesel tractor. This machine also reclaims stone from the stock-pile and discharges it into the track hoppers.

Under each of the two kiln-feed bins is a Schaffer Poidometer which controls the rate of feed. From each Poidometer a separate but identical system carries the stone to the kiln. Each system consists of an inclined belt-conveyor, a bucket-elevator and a Link-Belt vibrating screen. This removes any minus-¼-inch material which is chuted into a hopper and hauled away.

The preferred size of stone is ¾- to 1¼-inch, but ⅜- to ¾-inch and 1¼- to 2-inch sizes are also accepted. Each size is burned separately.

One of the three centrifuges which partially dewater sludge from carbonator tanks (International, Austin).

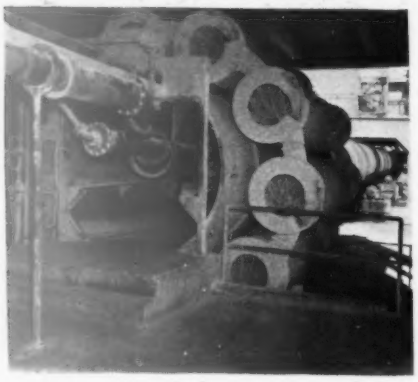
The oversize from the screens is fed through spouts into two 7½- and 8½- by 320-foot Allis-Chalmers all-welded rotary kilns with five riding rings. Harbison-Walker Alusite brick is used in their burning zones. They are driven through gear reducers by 60-horsepower 4-speed Reliance a.-c. motors which can drive

Hammer-mill and two gyratory crushers (International, Austin).

the kilns at speeds of 0.45, 0.6, 0.9, or 1.2 r.p.m. Each kiln drive also has an auxiliary drive through an Allis-Chalmers gasoline engine.

Each kiln is direct-fired with pulverized coal by a Number 412 Raymond bowl-mill under the kiln firing floor. The coal used is being received in cars although provisions for boats have been made. The unloading and handling system is similar to that used for stone except that it has a capacity of 100 tons per hour. The coal can be stock-piled and reclaimed by a second Gar Wood scraper and Allis-Chalmers tractor combination. An interesting feature is the fact that both tractors have fully-inclosed cabs with air-filtering systems which insure the comfort of the driver under all conditions. On the kiln-firing floor, under the two coal-mill feed bins, are Richardson batch-type scales which feed coal into the coal-mill hoppers in 213-pound batches. Jeffrey conveyors and elevators are used.

The draft for each kiln is supplied



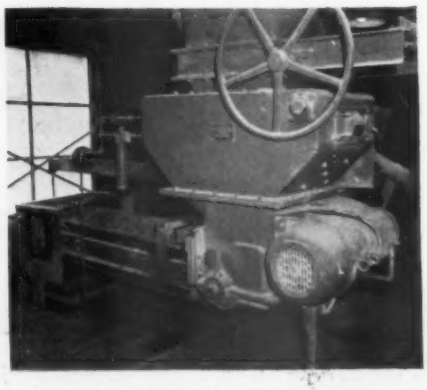
Cooler and gas burner on the 298-foot rotary kiln (International, Austin).

by a Clarage fan which draws the exhaust gases through a 6-unit Buell dust-collector and a scrubber of original design. The clean gas can either be exhausted through a single stack or delivered through an underground concrete duct for use in process. The collected dust from each kiln drops into a hopper from which an inclined screw-conveyor carries it to a tank. There water is added and the slurry is pumped to waste.

Each kiln has a control board with complete instrumentation to control all the related equipment. Leeds-Northrup Ray-O-Tube indicating pyrometers register hot-zone temperatures. Other features are automatic kiln-draft controls, coal-mill-drying-air temperature controls, ammeters and other instruments for the kilns, slakers, coal mills, draft fans, etc. This board was designed by the company's engineers in co-operation with Allis-Chalmers. All the instruments are in a dustless glass inclosure with all controls outside.

Stone-storage and reclaiming system at Mathieson Alkali plant.

The lime is discharged from the kilns into two 8- by 52-foot Allis-Chalmers rotary slakers which are driven at the rate of 2 r.p.m. An eye hole in the kiln floor enables the burner to see the lime going into the slaker and the preliminary slaking for better control. The milk-of-lime overflows, over screens which remove lumps, into a run-down trough from which Scherzer general-process pumps feed it into a 26-foot Dorr hydro-separator. The hydroseparator overflow goes to a pair of 150-foot Dorr torque-arm thickeners. The underflow of the hydroseparator goes to a 4- by 18⅓-foot Dorr Duplex rake classifier which removes sand, grit, unslaked lime, etc. The



Automatic weighing feeder which measures out stone for kiln (International, Austin).

overflow from this classifier also goes to the thickeners.

The overflow from the thickeners is used in the process for lime slaking, etc. The underflow is fed by Dorrco pumps to the main plant for use in the manufacture of magnesium-chloride "cell feed."

The brine used in this plant contains more than 10 per cent. of magnesium chloride and is pumped from nine wells within 10 miles of Ludington into storage tanks at the plant. In the carbonator department the magnesium chloride is precipitated, then filtered and passed through an evaporation-crystallizer, driers and various chemical processes. The product, known as cell feed, is magnesium chloride, a light flaky material, greatly similar in appearance to calcium chloride. This material is shipped to Marysville in closed hopper railroad cars.

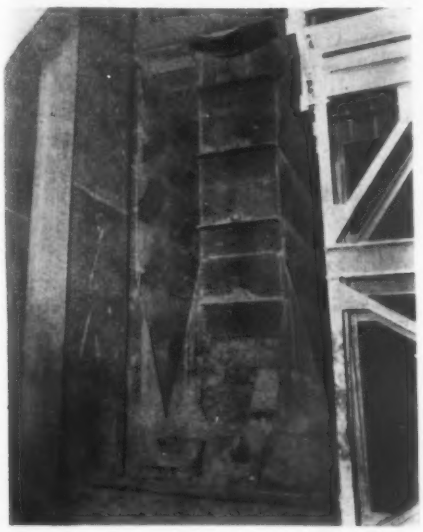
The Marysville, Michigan, magnesium-metal plant of the Dow Magnesium Corporation was in operation several months before the Ludington plant was in production and in the meantime was operating on magnesium chloride shipped from the Dow Texas plants. At this plant the chloride is converted into metallic magnesium by the Dow electrolytic process. In the electrolytic cells the chloride is converted into magnesium metal. This is then poured into molds. The chlorine is neutralized chemically and disposed of harmlessly in St. Clair River. Some alloying is done at Marysville, and the Dow Chemical Company, Bay City Division operates a casting plant at Bay City, Michigan.

International Minerals & Chemical Corporation The fact that the International Minerals & Chemical Corporation had available from its new Carlsbad, New Mexico, potash operations waste magnesium-chloride liquor was one of the main reasons

Another weighing device on kiln-feed conveyor (International, Austin).

why its magnesium plant near Austin, Texas, was built. As this liquor represents only about 30 per cent. in bulk of the raw material used the 500-mile railway haul is not important. The plant site was chosen because ample low-cost electricity was available and because the existence of large quantities of dolomite, serpentine, magnesite, and other magnesium-bearing ores in this area assures an inexhaustible supply. Good labor conditions and the temperate climate were also inducements.

The dolomite now being used comes from a deposit which is near Burnet, Texas, 45 miles west of the plant, and contains enough suitable material for several years' operation. It contains an average of 43 per cent. magnesium carbonate, 55 to 56 per cent. calcium carbonate, 1 per cent. silica, and traces of iron and aluminum. The silica content is well below the 2 per cent. maximum acceptable to International. Samples of rock from the wagon-drill holes are sent at once to the plant to make possible tight quarry control.



Two of the three continuous hydrators (Mathieson Alkali).

The crushed dolomite rock is discharged from railroad cars through a 6-inch grizzly into a track hopper from which a pan-feeder discharges it on a long 24-inch belt-conveyor which passes through a transfer-house on its way to the top of the crusher building. A magnetic head pulley removes tramp iron before the rock is discharged on a 4- by 10-foot Allis-Chalmers Ripl-Flo 2-deck screen. The rock off the top deck of this screen goes to a Telsmith gyratory crusher and that off the bottom deck is split to an Allis-Chalmers Type R 322 crusher and a Jeffrey Type C hammer-mill.

The minus-1¼-inch products of these crushers are discharged on a 24-inch return belt-conveyor to the transfer-house. A split chute makes it possible to return the stone to the conveyor for delivery to the screen or to discharge it on a 24-inch stationary boom conveyor for discharge on a 5,000-ton stock pile. A Sauerman Crescent scraper reclaims the stone from this pile to an auxiliary hopper over the first conveyor.

The minus-1¼-inch stone passing through the bottom deck of the screen is carried on another long 24-inch belt-conveyor to the top of the kiln-feed building. There the stone can be discharged on a 4- by 14-foot Allis-Chalmers 3-deck screen for segregating sizes if desired. This entire system was designed to crush and screen rock from 6-inch size down. Temporarily, however, crushed and sized rock is available and the crushing and final screening stages are not needed. At present this screen is being by-passed and the stone from the conveyor is discharged by gravity into one bin and by short belt-conveyors into the other two bins.

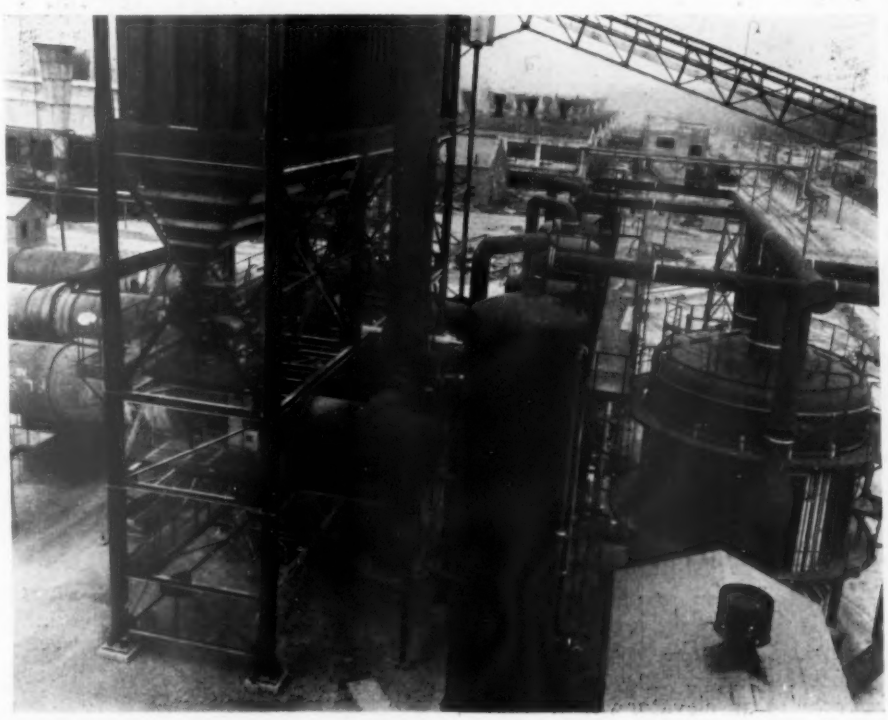
Under each of the three 200-ton conical-bottom steel bins is a Smidth reciprocating-type weighing feeder. The three feeders discharge the stone on a 16-inch horizontal cross belt-conveyor on which is a Merrick pivoted Weightometer. From this conveyor the rock is discharged into the 8- by 298½-foot Smidth kiln which is equipped with a single-row Unax cooler. The kiln is lined at its feed end with a hard, abrasion-resisting brick. No chains are used in it. The kiln is driven through a speed-reducer and gears by a 4-speed electric motor and has an auxiliary gasoline-engine drive.

The kiln has a fully-automatic control system for draft, speed, temperatures, etc. Thermocouples located at the burning zone and the discharge end of the kiln register on a recording pyrometer on the kiln-control board.

The exhaust gases from the kiln are drawn by a unit draft fan through a dust-cleaning chamber and damper. Following the fan is a circular collecting tank from which the air and gas can be discharged to the atmosphere through a 6- by 125-foot M. W. Kellogg reinforced-concrete stack. If desired, the gas can go from the tank through a series of three 8- by 14-foot cyclone collectors from which the CO_2 gas passes through a water scubber before it goes to the carbonators in the process plant.

The collected dust can be discharged to waste or for re-use by a Sutorbilt air-conveyor system.

The high-magnesian "dolime" is discharged from the cooler on a pan-conveyor from which it is elevated to hoppers over Raymond high-side-roller mills. The pulverized lime is discharged into a 100-ton storage tank from which Ross chain feeders discharge it into a pair of Dorr slakers. The mixed hydrate slurry is pumped to the carbonators in which CO_2 gas



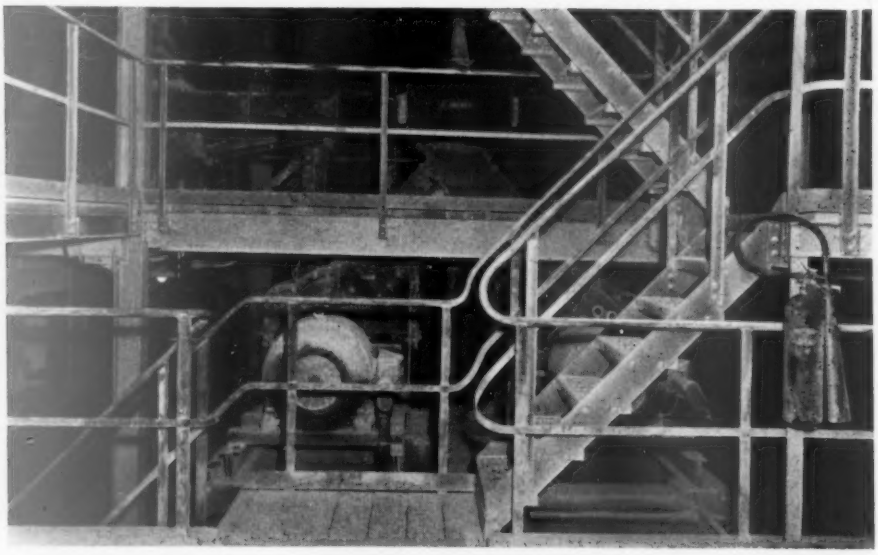
Feed ends of the three kilns and stone bins at left. At right are the precipitator and scrubbers which clean the CO_2 gas (Mathieson Alkali).

is added to reconvert the calcium into calcium carbonate.

The product of the carbonators goes to three Bird centrifuges which partially dewater it, the extracted liquid being returned to the slakers. The cake from the centrifuges is re-pulped with magnesium-chloride liquor from the thickeners in a battery of tanks. These are followed by reactor tanks—in which hydrochloric acid from the company's adjacent acid plant is added. This converts the magnesium hydrate into a magnesium-chloride liquor with calcium carbonate in suspension. This goes into Dorr thickeners from which a small part of the overflow liquor is returned to the re-pulpers for re-use.

The calcium-carbonate slurry underflow from the thickeners is pumped to a pair of Oliver panel-type filters from which the calcium-carbonate cake is wasted.

General view of Mathieson Alkali plant showing the lime kilns, hydrating, grinding, briquetting and evaporating buildings. Carbonating towers at extreme left.



Electric vibrating feeders which feed lime from hoppers into two hammer-mills (Mathieson Alkali).

The magnesium-chloride liquor from the thickeners and filters is the final product except for evaporation of the water and the removal of small traces of impurities. The liquor goes first to Ozark submerged-combustion evaporators which double the concentration. The 34-per cent. liquor is then treated with magnesium sulphate to precipitate any remaining traces of calcium before going to the Oliver filters and a Schriver press filter for removal of the gypsum cake which is wasted.

The 34-per cent. liquor from the filters is further concentrated and dehydrated. The solid magnesium-chloride is carried by a drag-chain conveyor to an elevator which feeds two driers of Dow design. The dried product is the magnesium-chloride cell feed. Flight-conveyors carry this material to the electrolytic-cell building which is identical with those in the Dow plants.

This operation includes an alloying department in which the magnesium metal is alloyed with aluminum, zinc, etc., for structural and incendiary purposes but no casting is done.

The ground was broken for the plant in January, 1942, and the first metal was dipped at this plant on October 31, 1942. By the following January it was in full production. By the first week of November, 1943, this plant had produced the 24,000,-000-pound quota set for it for the first full year of operation and the production during a recent 7-month period was 10 per cent. over its rated capacity.

The designing of this plant up to the evaporators was done under the direction of Dr. Paul V. Manning on the chemistry and J. A. Barr on the mechanical problems. The Austin Company had the general contract for the designing of the buildings and the construction of the entire plant. The Continental Gin Company supplied all the conveyors, elevators and some of the feeders in the rock department. The Link-Belt Company supplied the conveyors and elevators in the magnesium-chloride department.

Mathieson Alkali Works Inc.

As stated earlier, the process of magnesium manufacture used by the Mathieson Alkali Works, Inc., at its Lake Charles, Louisiana, plant is original and was developed by that company over a period of about seven years. It contains many new and patentable features and is similar to other processes in use only in that magnesium chloride is produced. The electrolytic magnesium cell used is an original design and produces marketable chlorine as a by-product.

As previously stated, the two raw materials used in this process are dolomite and calcium chloride—the latter a by-product of the company's adjacent 10-year-old ammonia-soda-process alkali plant. The fundamental reaction in the Mathieson process is the combination of these two materials to make magnesium-chloride liquor which is then purified, concentrated in special triple-effect evaporators of unique design, and

dried to granular form in spray driers. The granules contain about one molecule of water per molecule of magnesium chloride and only traces of magnesium oxide. They are then briquetted before going to the electrolytic cells in which the magnesium metal and chlorine are separated.

The dolomite used in this plant is shipped about 350 miles by railway from the quarry of the Victoria Gravel Company near Burnet, Texas, which also supplies the International plant at Austin. This rock, 1 to 3/16 inch in size, is discharged from cars into a track hopper. The interesting stone-storage-and-reclaiming system used was designed and supplied complete by Robins Conveyors, Incorporated, which supplied all the other conveyors and elevators used in this plant. A belt-conveyor (Number 2) feeds the stone from the hopper either to the main plant conveyor or to a cross belt-conveyor on which is a Robins traveling tripper stacker with a stock-piling boom conveyor. This stacker moves back and forth the length of the storage pile and can store 20,000 tons of stone. A Robins traveling reclaiming machine recovers the stone from storage and feeds it back to conveyor Number 2 which is reversed to feed to the main plant conveyor. This machine actually consists of a traveling conveyor mounted on four sets of rails and traveling the full length of the storage pile. On the conveyor is a carriage with a bucket-loader which moves back and forth along this conveyor the full width of the pile. The main conveyor is inclined and discharges the stone by means of a shuttle belt-conveyor into three steel kiln-feed bins. This entire system has a capacity of 1,000 tons in 8 hours which about equals the 24-hour capacity of the kilns.

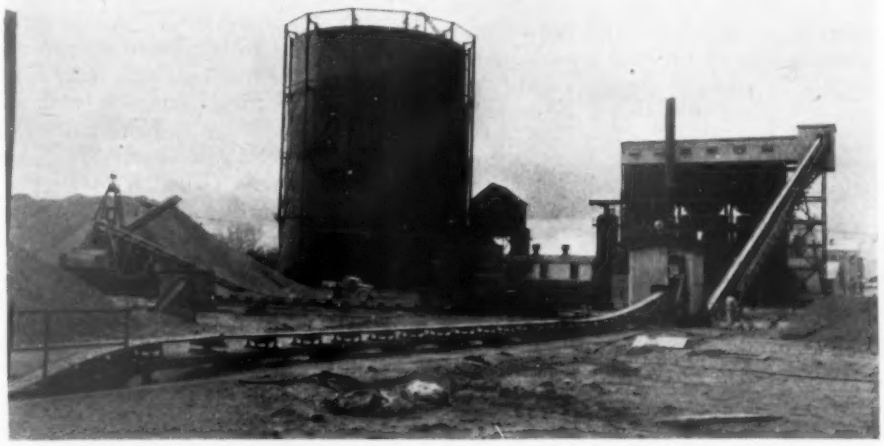
Under these bins are Smidth reciprocating-type weighing and recording feeders which are set at any desired ratio to the kiln speed and then automatically maintain that ratio for any speed. The three 7- by 325-foot Smidth rotary kilns are the latest design with all-welded shells and complete automatic control. No heat-transfer chains are used except in the single-row Unax cooler attached to each kiln. The kilns are fired with natural gas. The kiln exit gases pass through scrubbers and a Cottrell precipitator before going to a 750,000-cubic foot CO_2 gas holder for use in the plant. A steel stack provides for release of surplus gas to the atmosphere.

The lump lime is carried from the coolers by duplicate series of conveyors and elevators to the hydrator-feed bins. Ahead of these bins is a pulverizing system which is now being by-passed but which may be used in the future. This system consists of bins from which Jeffrey-Traylor electric vibrating feeders will discharge the lime into two Williams hammer-mills. Bucket-elevators will feed the pulverized quicklime to the hydrator-feed bins.

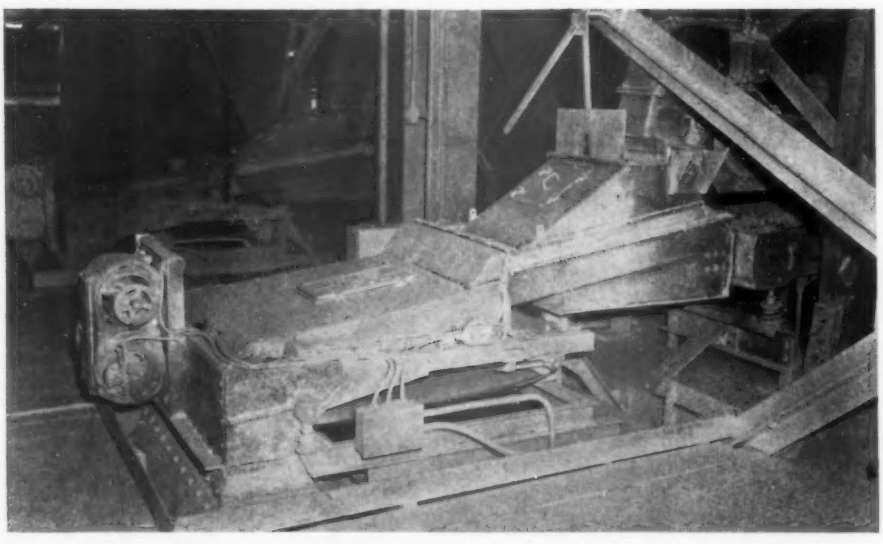
There are three Kritzer 16-ton per hour continuous hydrators of the latest design. Following these are four Raymond beater mills of conventional design with the usual appurtenances. Through a flexible flow-sheet in this department any desired number of hydrators and mills can be used at any time. The hydrated dolomitic quick lime or "dolime," is conveyed to a primary mixing tank where it is mixed with calcium-chloride liquor. Jeffrey Waytrol feeders are used for the lime feed.

This calcium-chloride liquor is pumped from the company's ammonia-soda plant into a Dorr thickener which removes sand and any other impurities. The clear liquor overflows from the thickener into a large reservoir and is pumped from there into the mixing tank. The ensuing steps in processing the calcium oxide-magnesium oxide-calcium chloride liquor are: carbonation which precipitates the calcium carbonate and at the same time produces magnesium chloride in solution; two stages of filtration which produce a clear liquor of 10 per cent. magnesium chloride strength; triple evaporation to 40 per cent. strength; and spray drying which produces the magnesium-chloride granules.

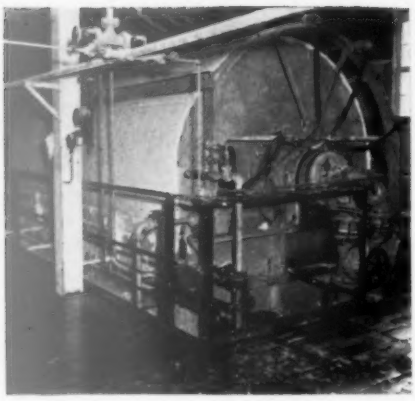
The magnesium-chloride granules are then sent to Komarek & Greaves presses from which the briquettes are conveyed to the cell-houses. When completed, the plant will have a capacity of 75 tons of magnesium metal daily along with an undisclosed amount of marketable chlorine. The company also operates an



Stone-handling system with traveling stacker and reclaimer at left. CO_2 gas receiver and kiln-feed bins in background (Mathieson Alkali).



Feeders which screen the lime and feed it to the mixers (Mathieson Alkali).



One of the filters which help remove moisture from magnesimu-chloride cell feed (Mathieson Alkali).

alloying plant on the property but does no further processing of the metal.

This plant was located at Lake Charles mainly because of the availability of the by-product calcium chloride. The source of low-cost, high-grade dolomite is also not too far away. The Calcasieu River on which this plant is located supplies adequate quantities of fresh water for the 85,000 kilowatt steam-generating plant which has just been completed. An additional power-plant of 40,000 kilowatt capacity is under construction. An added advantage is the low-cost natural gas which is used in the kilns, the generating plant, and other departments.

Diamond Alkali Company Little is known about the operations of the Diamond Alkali Company at Painesville, Ohio, except that an electrolytic system similar to Dow's is used and that the base exchange involves ammonium chloride. The chlorine required is obtained from the waste liquor from the company's adjacent ammonia soda-process alkali plant. The magnesium comes from dolomite. Alloying of the magnesium metal is done at this plant but there are no provisions for casting.

Three of the five beater mills which can be used for pulverizing hydrated lime (Mathieson Alkali).

Basic Magnesium Inc. The operations of Basic Magnesium, Inc., at Gabbs Valley and Las Vegas, Nevada, have already been described in some detail in these pages.[1] Although the first magnesium ingots were produced in August, 1942, one year after the contract for the construction of this plant was signed, production did not come up to expectations until much later and even now changes are being made.

The magnesite deposit, which is the chief source of raw-material supply for this plant, is at Gabbs Valley, about 300 miles north of the reduction plant but 1,100 miles by railway. The mining is being done selectively by several open-pit methods involving the use of churn and wagon drills. The requirements for suitable material are that it must contain not more than 4 per cent. insoluble material, 4.5 per cent. CaO, or 2 per cent. FeO and $A1_2O_3$. The MgO content should be about 40 per cent. Bucyrus-Erie 1½-cubic yard shovels load the ore into Kenworth 9-cubic yard trucks which haul it to the concentrating plant. A series of Allis-Chalmers and Nordberg Symons crushers and Tyler Ty-Rock screens delivers 1½-inch to 8-mesh ore to a Southwestern Engineering Company movable conveyor stacker which builds up a 45,000-ton stock pile.

After recrushing and grinding by four 7- by 9-foot Allis-Chalmers grate mills, in closed circuit with Wemco screen classifiers, the 55-per cent-through-325-mesh slime goes to the flotation department. There four circuits of "modified" and Fagergren rougher cells remove the tailings to waste. The concentrates go to four circuits of "modified" and Denver cleaner cells from which the tailings are returned to the rougher cells. The concentrates from the cleaner cells go to eight Akins classifiers from which the overflow goes to six "modified" cells which reclaim some of the ore. This, with the main stream from the classifiers, goes to four 14- by 18-foot Dorrco filters. Next in series are four Ruggles-Cole driers and four Nichols-Herreshoff roasters. The calcined magnesite is now hauled 31 miles to the railroad by two 15-ton Fruehauf semi-trailer and trailer combinations with Cummins super-charged Diesel engines. When sufficient trucks are available, the entire 340-mile haul to the reduction plant will be taken care of by a trucking contractor.

The concentrator was designed by the Southwestern Engineering Company and it was built by the Macdonald Engineering Company.

Following is a brief description of the flow-sheet of the reduction plant. The calcined magnesite is mixed with coal salts and peat. The peat is first shredded in hammermills and the coal and salts are ground to minus-200-mesh in Raymond pulverizers. Jeffrey Waytrol feeders blend these materials into mixers and a concentrated magnesium - chloride solution is then added to the mixture in pug-mills. Part of this material is dried in a drying oven followed by a tunnel kiln and part of it in driers and 100-foot Kennedy-Van Saun rotary kilns. The product then goes to electric furnaces or chlorinators in an atmosphere of chlorine which is made in an adjacent plant. The $Mg\ C1_2$ liquid formed is transferred to electrolytic cells from which the molten magnesium is removed. After refining it is cast into bars for shipment. An alloying plant is operated but no casting is done here.

Kilns which calcine dolomite with coolers below (Dominion Magnesium).

[1][See Stelley (Harry A.), *Magnesium—Critical War Metal*, PIT AND QUARRY, August, 1943, pages 49-54.—ED.]

Mining Engineers Discuss Geological and Operation Problems at New York

another ON THE SPOT report

THE first paper presented at the meeting of the Industrial Minerals Division of the American Institute of Mining and Metallurgical Engineers which began at the Waldorf-Astoria Hotel, New York, Monday afternoon, February 21, was *Beryl, Its Sources and Uses,* by E. H. Dawson, mining engineer. Mr. Dawson first discussed government efforts to promote production and conserve existing supplies. Through 1942, he said, there was an ample supply of this material but in 1943 the demand, accelerated by the war, began to exceed the supply. He described the work done by the Bureau of Mines and various companies in developing a successful process for the flotation of this mineral.

H. M. Bannerman, United States Geological Survey, in a paper entitled *Geological Exploration for Mineral Deposits of the Pegmatite Type,* said that the war had greatly increased the demand for such minerals and that the survey, in co-operation with other governmental bodies, is actively studying known deposits and looking for others. In general, he said, beryl is found in the same dike with scrap mica, never with strategic mica.

Mica in War was the subject discussed by Captain R. G. Wayland, United States Army. Captain Wayland spoke only of block mica as all other types are now available in ample quantities to meet all military and civilian needs. He described efforts being made to overcome the shortage of high-grade mica by using in its place wherever possible a lower grade, which was formerly preferred but not necessary. The highest types, he said, are needed for military short-wave radio sets and the use of stained mica for the condensors in other types of radios offers the biggest single hope for savings. Other factors helping to improve the situation are the increased output from Brazil and India, improved methods of cutting and punching, the shift to ceramics for spark plugs, etc. He also mentioned instruments developed by the Bell Telephone Company to supplement visual inspection of sheet mica and which show that much apparently inferior mica is actually suitable for the highest type of work.

Oliver Bowles, Director of the United States Bureau of Mines, chose as his subject *Nonmetallic Minerals Speed the War.* In this paper he reviewed briefly the progress that has been made in the production of the various industrial minerals vital to the war effort. Quartz crystals are still the No. 1 strategic mineral and everything possible is being done to increase production and conserve existing supplies. Improved sawing methods and the use of lower grades and fragments wherever possible is helping. According to Dr. Bowles, most of the good crystals are coming from Brazil but some were found in Arkansas and California in 1943.

Asbestos, he said, is also very important and the peak Canadian output is now being supplemented by shipments from Africa. The output of fluorspar in 1943 set an all-time high of over 400,000 tons and the situation is similar in many other industries. In closing Dr. Bowles said that food is now, and for many years will continue to be, a vital material and that the production of fertilizers, agricultural limestone and anything else that will increase farm yields is in for a boom. He estimated that phosphate production in 1944 will be over 8,000,000 tons, 1,500,000 tons above the 1943 all-time high.

Charles Durgin, Monsanto Chemical Company, in describing *Some of the Lesser-Known Properties and Uses of Phosphates,* a paper prepared in co-operation with W. A. Weyl, Pennsylvania State College, stressed the use of this material particularly in the manufacture of various glasses and in the preparation of fluorescent materials.

Occurrences and Uses of Wollastonite from Willsboro, New York, was the subject of a paper presented by J. G. Broughton, New York Museum, and prepared in co-operation with K. D. Burnham, St. John's Shipbuliding Company. Mr. Broughton stated that there are large deposits in the east but that so far the production has been small. The output in 1943 was about 100 tons but this will be doubled this year. The lack of magnetism, he said, is the basis of separation of this mineral from others with which it is associated and for good separation it must be ground to 35 mesh or finer. The present use of wollastonite, said Mr. Broughton, is chiefly for coating welding rods and the General Electric Company is using it as a flux for large automatic welding operations. It is also employed as a linoleum filler and can be used for many other purposes.

Discoveries of Potash in Eastern Utah was the subject of a paper written by B. W. Dyer, United States Geological Survey, but read in his absence by B. C. Burgess. In drilling one oil company found deposits 10 to 100 feet in thickness between the 3,318- and 3,548-foot levels. More exploratory drilling is now being done and the deposits are said to be workable.

Recent Work on Magnesium Mineral Resources by the Federal Geological Survey was presented by Eugene Callaghan of the Geological Survey. According to him, of more than 100 deposits of magnesite investigated, the most promising, at Sloan, Nevada, contains more than 67,000,000 tons of material. He described briefly some of the various methods of magnesium manufacture now in use and some of the outstanding plants. The raw-material supply and plant capacity are now both far in excess of demands.

At the Tuesday morning meeting various members of the Bureau of Mines, and the Pennsylvania and United States Geological Surveys presented a symposium on high-alumina clays in various parts of the country.

Mica Distribution in Western North Carolina Pegmatites was the subject of a paper presented by J. C. Olson and prepared in co-operation with J. M. Parker III and J. J. Page, all of the United States Geological Survey. He described a general survey which was made in 1939-1942 to locate important deposits which are now being studied in detail. The usefulness of the studies of the distribution of mica in a pegmatite dike as a guide in mining was stressed and it was found that block mica is nearly always found to be concentrated at certain points. The aim of the survey is to increase the output of this vital material and to prevent the development of unprofitable deposits. Of the more than 700 mines in the

state, he said, only about 250 are now active.

The Characteristics of Some New England Mica-Bearing Pegmatites were described by E. N. Cameron in a paper prepared in co-operation with D. M. Larrabee, A. H. McNair and G. W. Stewart, all of the United States Geological Survey. He said that since the summer of 1942 the survey has studied more than 200 pegmatite dikes in Maine, New Hampshire and Connecticut, the most important of them in the latter two states. Five major types of sheet-mica concentrations are now recognized and a knowledge of these is a good guide to the exploration and development of the deposits. The concentrations are of the wall-zone type, the sheet type, the quartz-core type, the quartz-pocket type, and the disseminated type. Descriptions were given of mines which are typical of these various formations. The wall-zone types of deposits, said Mr. Cameron, are the most productive in New Hampshire and Connecticut as they contain the highest concentrations and are the greatest in extent. The quartz-core type, he said, is not as productive and is more expensive to work but produces much good sheet mica. The other types can not ordinarily be operated profitably. In the wall-zone type of deposit 42 tons of rock must be moved per ton of run-of-mine mica produced and in the quartz-core type 75 tons must be moved.

H. S. Spence, who presided over this part of the meeting, described and showed illustrations of huge sheets of mica which are being produced at a new mica deposit in Canada. These sheets range up to 8 by 10 feet in size in books up to 24 inches thick weighing 3 or 4 tons. In 1943, he said, 18.2 per cent. of the mica produced at this mine was clear sheet grade, 37 per cent. was No. 2 grade, and 45 per cent. was No. 3.

The Mineralogy and Petrology of the Current Creek Magnesite District, Nevada, was the subject of a paper prepared by G. T. Faust and Eugene Callaghan, United States Geological Survey, and read by the former. The authors described these deposits, which lie about 20 miles south of Ely, Nevada, and stressed particularly the replacement of tuff by magnesium-bearing waters.

Geological Occurrences of Rutile was the title of a paper by C. S. Ross, United States Geological Survery, in which he described deposits in the Piedmont region in Virginia and near Magnet Cove, Arkansas. Some of the Arkansas deposits are said to contain up to 4 per cent. rutile.

The Harding beryllium-tantalum-lithium pegmatites of Taos County, New Mexico, were described by H. R. Jahns in a paper prepared by him in co-operation with L. A. Wright, both of the United States Geological Survey. He said that unsuccessful attempts were made in 1929 to mine spodumene and lepidolite in this area and that the production of spodumene, beryl and tantalum was begun in 1942. This area was mapped by the survey in 1942 and diamond drilling was done by the Bureau of Mines in 1943. The regularity of the mineral zones, he said, is striking and is added evidence that pegmatites are not irregular and that fairly definite estimates can be made.

The Tuesday afternoon meeting was devoted to a series of papers having to do with post-war mineral control. In a paper, *Control of Mineral Supplies of the Axis Powers to Preserve Peace,* C. K. Leith, War Production Board, said that the oversupply of most minerals which now exists is our chief problem and that production is being cut down and contracts cancelled wherever this seems advisable. The problem now confronting us, he said, is how much of various materials will be needed and how much to cut down the domestic and foreign production, the latter being complicated by treaties, "good-neighbor" policies, etc. These cutback problems, said Mr. Leith, merge with the post-war problems which include those of equal access to raw materials, lend-lease repayments with raw materials of which we have an oversupply, etc.

Chester A. Fulton, head of The Southern Phosphate Corp., elected president of A. I. M. E.

The control of the supplies to Axis nations, said Mr. Leith, is a major problem and he referred to discussions along this line which are intended to prevent repetition of the mistakes made after the last war. The question of whether or not force shall be used to keep the peace is not, he said, a function of the mineral industries but they are vitally interested in any decisions which will be made on the amounts and types of minerals to be made available to the Axis powers. He proposed the formation in each country of agencies which would supplement existing cartels in controlling the flow of these materials. The Atlantic Charter, said Mr. Leith, promises these powers only the necessary raw materials for economic prosperity but not for use in rearming or for any warlike purposes. The proposed agencies would make it possible to detect any overt move and stop it but would not limit world trade otherwise. The lack of such a program of information, and enforcement was our trouble after the last war and should not be repeated, he said.

Other papers on this program went into the phases of this problem that concern the production of some of the more important materials, such as petroleum, iron and steel, magnesium and aluminum.

At the Wednesday morning meeting B. C. Burgess, Spruce Pine, North Carolina, reported on the mining and preparation cost of mica, supplementing information presented at a previous meeting. A paper, *Stope Filling at Baker Borax Mine, California,* was presented by C. G. Grim, Pacific Coast Borax Company, and another, *The Roofing Granules Industry in Pennsylvania,* by R. M. Foose of the Pennsylvania Geological Survey.

Block talc was the subject of a discourse by J. E. Eagle, Non-Metals Section, Miscellaneous Minerals Division, War Production Board. He covered the entire history of talc development, including its sources, types and uses. The only shortage in this field, he said, is that of labor.

In presenting *Quarrying Methods of the Barre, Vermont, District* the author, W. P. Mould, Rock of Ages Corporation, showed many interesting slides illustrating the manner in which various types of formations are most efficiently quarried.

S. M. Shallcross (Warner Company, Philadelphia) presented a very interesting paper on the *Flow of Granular Materials in Bins,* which

(*Continued on page* 104)

Separate Sessions for Sales and Operating Men Featured at NCSA Annual Convention

another ON THE SPOT report

DRAWN by the promise of an interesting and informative program, hundreds of stone producers from many states attended the twenty-seventh annual convention of the National Crushed Stone Association, held in the New Yorker Hotel, New York, January 31 and February 1 and 2. From the problems of administration, employer-employee relations, government regulation, and priority relief the discussions ranged over the field of operating methods, salesmen training, repair and maintenance, and the broader question of post-war highway construction in New York State and the country as a whole.

Interest in the 1944 gathering was unquestionably heightened by the circumstance of its ending a two-year lapse occasioned by the cancellation of the 1943 meeting in compliance with the government's request to restrict travel.

Trends in Industry Following his welcome and greetings to the convention, President William M. Andrews presented the reports of the regional vice-presidents on business conditions during 1943 and the outlook for 1944.

In the New England region the volume of crushed-stone business during 1943 averaged 55 per cent. of the 1942 volume, with prices generally unchanged, and with highway construction and ballast each accounting for 30 per cent. of the total, building 25 per cent. and miscellaneous uses 15 per cent. Due to the low demand no serious transportation difficulties were experienced, but the man-power shortage was felt by all producers, and with some it was acute. Producers are uanimous in regarding the outlook for 1944 as extremely poor, with the price structure and the distribution of demand probably showing no change.

The over-all picture in the northern region is somewhat brighter, with some producers reporting volume for 1943 as much as 50 per cent. over 1942, although others show appreciable drops. Demand for chemical and metallurgical stone was excellent, but activity in this field was restricted by the boat shortage. Producers generally look for a slight drop in 1944 volume, and for transportation and man-power shortages to be more critical than in 1943.

In the eastern region the demand was less than 50 per cent. of plant capacity as a whole, but a few sections experienced capacity operations due to war work and fluxing-stone demand. Highway construction was poor and railroad ballast showed only a slight increase, while shipments of agricultural limestone fell off sharply. Most producers anticipate further declines in 1944 due to continued restriction of highway work, and there is general concern over the growing man-power shortage. A number of companies were shut down completely.

The report from the central region shows a general reduction in 1943 volume of shipments, with prices stable, or, in a few cases, even somewhat higher than in 1942. Highway construction was down sharply, but the agricultural-limestone situation showed a slight improvement. The outlook for 1944 is not encouraging. The demand for chemical and metallurgical stone

More than 200 persons attended the banquet on Monday evening, February 1.

and agstone may increase slightly, with no change in railroad ballast and a decrease in all other uses. Railway shipments are generally satisfactory, but the trucking situation promises to become acute in 1944. Almost all producers report serious shortages of competent man power.

In the midwestern region, except for part of the year in the Chicago district, the demand was considerably below capacity. In keeping with the rest of the country highway construction was down, while railroad ballast took from 15 to 50 per cent. of production. A few producers had good business in chemical and metallurgical stone, and agricultural limestone showed a slight increase over 1942. About half the producers reporting look for better business in 1944, while the remainder anticipate a decided drop. There is general agreement that railway and truck transportation and man power will present serious problems this year.

The picture is somewhat brighter in the southern region, where the 1943 demand ran from 75 per cent. to 100 per cent. of capacity. Highway construction follows the pattern for the rest of the nation, while stone for building construction, in the case of one producer, accounted for 90 per cent. of production. It is expected that in 1944 the volume of shipments will be down slightly, with the price levels remaining stable. No increase in transportation difficulties is looked for, although all producers anticipate more trouble with manpower shortages.

In the southwestern region, where the demand was 90 per cent. of capacity, both the volume of business and the price structure showed little change in 1943. Defense projects accounted for 50 per cent. of production, railroad ballast 30 per cent., highway work 17 per cent. and miscellaneous uses 3 per cent. Due largely to an anticipated sharp decline in production for federal defense projects, it is expected that the 1944 volume will be about 50 per cent. of that of 1943. An increase is expected in the production of both railroad ballast and stone for heavy construction if labor is available. Producers look for a car shortage this year, and it is probable that the supply of both skilled and common labor will become critical.

The volume of production in the western region showed no change in 1943, and prices generally were stable. The outlook is for the demand in 1944 to drop about one-third, with railroad ballast probably showing an increase. The area experienced a serious car shortage in 1943, but it is hoped that the situation will become less acute as new equipment becomes available and production decreases. The manpower shortage is, of course, extremely critical.

Milo A. Nice, Hercules Powder Co., new chairman of the Manufacturers' Division and C. H. Roberts, Traylor Engineering & Manufacturing Co.

Mr. Andrews closed with an appeal to all producers to unite their efforts in the furtherance of sound plans for the post-war period.

In his review of technical activities during the past year Engineering Director A. T. Goldbeck discussed in general terms the wide range and scope of the problems submitted to his office. Following closely the pattern of previous years, innumerable requests were received for special work, laboratory investigations and technical advice. He commented particularly on the large increase in the volume of requests for technical assistance on problems relating to airport maintenance and construction. In closing he urged distant producers to avail themselves of the technical services of his office by correspondence.

The report of Administrative Director J. R. Boyd was devoted mainly to discussion of the innumerable industry problems related to government war-time control. Of these, he said, the question of the essentiality of the crushed-stone industry had been the most critical, but the position had improved somewhat in recent months, with the trend now definitely toward the restoration of authority to local boards. He revealed that the association has repeatedly protested against the non-essential classification of stone quarrying in various regional bulletins, either by omission or by specific reference, and that such protests have usually resulted in the policy being revoked.

Of ceiling prices Mr. Boyd commented briefly that a flat dollar ceiling for the crushed-stone industry would be wholly impractical, and that fortunately the Office of Price Administration appears to have accepted this view.

In commenting on the tripartite panels now set up in 12 district offices of the War Labor Board, Mr. Boyd stressed the urgent importance of industry representatives on such panels being acquainted with the particular problems of the crushed-stone industry. It is the clear right of producers, he said, to acquaint industry representatives with their problems.

Following an introduction by Otho M. Graves, Edward W. Bauman, recently appointed Field Engineer for the association (*P & Q*, November, 1943, page 52), addressed the membership for the first time in his new official capacity. Mr. Bauman gave a brief analysis of the duties and functions of the field engineer in rendering service to members of the association. It is of paramount importance, he pointed out, for the field engineer to be on the spot whenever important developments are brewing in crushed-stone activities.

Recalling that at the present time only 25 of the states have specifications for the transverse strength of concrete for highways, Mr. Bauman said that one of his first concerns would be the spreading of this practice to other states.

He concluded his remarks with a tribute to the ever-widening recognition being given to the research and development work of Engineering Director Goldbeck.

T. J. Boxley (Blue Ridge Stone Corporation, Roanoke, Virginia) presided at the greeting luncheon on Monday, January 31. An official motion picture entitled *War Department Report* was shown. Prepared and released by the War Department, the film vividly depicts the magnitude of the task confronting the United Nations, and its wide circulation is expected to have a profound effect upon American workmen.

Particularly interesting are the film records captured from the enemy, showing his own men and equipment in action. A considerable footage is devoted to the German film record of the abduction of Benito Mussolini.

War-Time Controls In a session devoted to a discussion of *War-Time Controls Applicable to the Procurement of New Equipment and Maintenance, Repairs, and Operating Supplies* three representatives of government agencies participated. Dr. Marcellus H. Stow, deputy director of the Mining Division; James E. Bacon, chief, Nonmetallic Section, Mining Division; Roy Dagen, chief, Concrete Materials Unit; and Robert J. Carroll, assistant chief director (substituting for Michael B. Garber, consultant and former director), Construction Machinery Division represented the War Production Board and told of the latest changes in the provisions governing the purchase of new equipment and the procurement of the repairs and supplies needed to keep existing plants in operation.

With reference to the transfer of mining equipment from one operator to another, Dr. Stow explained that only an operator having a serial number can dispose of his equipment to another operator, and the latter must also have a mine serial number. Sales of equipment between one or more operators who do not have such serial numbers can be made only with the permission of the Mining Division. The purpose of this requirement is the keeping of equipment in the industry in which it can do the most good in furthering the war effort. Form 32 is used for obtaining the release of equipment from one producer to another. Controlled materials are now much more easily obtained than at any time during the war. Anti-friction bearings, large shovels, and track-laying tractors are still "very tight."

Mr. Bacon pointed out that Form 2910 must be attached to all applications for any priorities in the Mining Division for the purchase of equipment. Form 2939 is to be used with all applications for repairs, maintenance and operating supplies. Operators having mine serial numbers must maintain their plants in first-class condition to meet all possible demands for war production. Many stone producers have asked for permission to buy new pulverizing equipment because of the rapidly growing demand for agricultural limestone and of the availability of suitable raw material in stone formerly wasted. Mines not having serial numbers are entitled to an AA-5 rating for repairs, maintenance and operating supplies. Capital investment, said Mr. Bacon, means any item of equipment under $500 in value. If the value exceeds $500, Form 2910 must be filed.

The crushed-stone industry, with reduced amounts of equipment, reduced labor, and similar handicaps, has attained levels of production that would not have been believed possible by producers themselves if they had been told what they would be able to do, the speaker said.

In answer to a question, Dr. Stow said that producers should not use a priority rating in order to get motor-truck repair parts. If the supplier has no stock of the required part, application should be made by the owner to the Mining Division or to the Automotive Division of the War Production Board. The supplier has no right to require a priority rating from an owner needing truck parts. However, an AA-1 rating is needed to get solid truck tires needing steel rims. He said further that Form 617 is now obsolete.

Roy Dagen explained that under order CMP 5 a definite place has been given to the ready-mixed-concrete industry, providing an AA-2 rating for repair parts. He added that all bituminized-aggregate plants come under the control of the Building Materials Division.

Mr. Wolf of the New York City office of the War Production Board said, in answer to a question, that the L-158 order is usable in obtaining truck parts but that Army, Navy and other government agency orders may stand in the way. However a release can be obtained and no priority rating is needed. Regional offices of the W. P. B., he said, pass on PD-551 applications on amounts up to $2,500.

Mr. Carroll, who spoke in the absence of Mr. Garber, the scheduled speaker, said that his branch, the Construction Machinery Division, is responsible for both the construction and the distribution of construction machinery and that, in its work, has issued five limitation orders. These are L-53 covering the production and distribution of track-laying tractors; L-53b covering the distribution of tractor parts; L-192 covering the production and distribution of end products and repair parts of all construction machiney; L-196 covering used construction machinery; and L-127 which deals with the standardization and conservation of the materials used in the manufacture of construction machinery.

The D. C. Hickeys, senior and junior, of the General Crushed Stone Co.

L-192, which is the order of greatest interest to crushed-stone producers, was amended on January 10. It covers all types of equipment from rock drills to shovels and dredges, the complete machines and repair parts for them. Mr. Carroll said that, whereas at the time of its original approval raw materials were the bottleneck, now critical components and man power are the limiting factors. Internal-combustion engines, transmissions, axles, anti-friction bearings, tires, and so on are now the critical components.

Of the four schedules provided as part of L-192, A covered heavy machinery for which all buyers except the military services were required to secure a release; B covered small items—so-called "off-the-shelf" parts—which required ratings but no releases; C related to machinery made for and sold to no one but the military forces, although civilian purchasers had the right to appeal for releases to them; and D which dealt with a few items no longer manufactured. The amendment of January 10, referred to above, abolished Schedule C and transferred most of its items to Schedule A and a few of them to Schedule B.

Among the items transferred from old Schedule C to new Schedule A are bins, batchers, chutes, concrete carts, hoppers, and road forms. On Schedule A are to be found also bulldozer attachments, conveyors, crawler cranes, jaw crushers, roll crushers, portable crushing plants, derricks, crawler draglines, drilling machines, aggregate driers, finishers and pavers (concrete and bituminous), large hoists, portable bucker-loaders, truck-mixers, large concrete mixers (stationary), concrete pavers, asphalt plants, road rollers, scarifiers, scrapers, screening plants, crawler shovels, washing and screening plants, and other items.

In applying for the right to pur-

A. O. Witt, Schramm, Inc.; W. A. Wilson, Pit and Quarry; and Mr. and Mrs. Edward P. Larsen, Robins Conveyors, Inc.

chase such items the revised Form 1319 is used instead of the old PD-556 and is filed with the regional office of the W. P. B. If this office can not substitute used machinery where it is available, it makes a recommendation with respect to the essentiality of the applicant's operation and forwards the application to the Washington office for release of the equipment needed or a denial of the request.

Schedule B items, for which only a rating is needed, include such equipment as paving breakers, clamshell buckets, concrete buckets, dragline buckets, jackhammer drills, small mixers (7 cubic foot and less), portable engine-driven pumps (6-inch and smaller), and concrete vibrators. These items are obtainable through use of the P-56 order. PD-1-A applications are now rated up to $2,500 in the field offices of the W. P. B., the speaker said, but all the items in Schedule B are under this amount. A producer who is seeking to buy equipment for a construction job which is not covered by Preference Order P-56 can get a rated order, PD-1-A (now PD551), in his field office.

Mr. Carroll then described the procedure to be followed in applying for repair parts under the revised L-192 order. Before a supplier can furnish a producer with repair parts the purchaser must certify that they are needed for current maintenance of equipment in sound working condition, which means that the parts must be used to replace worn parts within 30 days after their delivery to him. The certification must say substantially: "Authorized under Order L-192." The certification implies that the purchaser will use the parts required in the manner just stated, that he does not have any of the required kind of parts on hand, and that he has complied with the provisions of L-196. Except for shovels and cranes up to 2½-cubic yard capacity, repair parts must not be ordered for any equipment listed on Schedule A that is older than January 1, 1930. This requirement has been adopted to simplify the process of providing repair parts by eliminating types of equipment for which parts may no longer be in stock in the manufacturers' plants. However, parts for the older machines can be obtained by making special application for relief from this provision. This is done by filing Form 1319 in quadruplicate with the purchaser's regional office, a district office or the Washington office of the W. P. B. In rare cases the W. P. B. then issues a directive under which the supplier is ordered to make delivery of the parts required. In order to accomplish this the Construction Machinery Division is required to make application to the Special Rating Branch of the W. P. B.

Referring to specific pieces of equipment, Mr. Carroll said that track-laying tractors are still extremely critical and that definite allocations are made by his division's Requirements Committee. Of the total production of such tractors, 85 per cent. has been going to the military forces and only 15 per cent has been available for civilian users, but of this remainder the Mining Division and the Lumber Division are allotted more than any other civilian claimants. Tractor parts are extremely critical, too, but no preference rating is needed for their purchase.

Mr. Carroll then spoke of Order L-196, which requires the taking in the field of inventories of construction machinery. He said that more than 350,000 items of used machinery had been inventoried since August, 1942, and $70,000,000 worth of such equipment had been transferred from sellers to buyers. Stone producers are not required to register under this order, but construction-machinery distributors and contractors must do so. Stone producers who are also contractors must register such equipment as is used in the contracting branch of their businesses. The list of items covered by L-196 has been reduced from 82 items to the following: shovels, cranes, draglines, backhoes (power type, crawler, rubber-tired, mounted or walking, manufactured after 1930); motor graders (self-propelled, earth-moving, 16,000 pounds and heavier, tandem and 4-wheel-drive types); tractors (track-laying type, Diesel and semi-Diesel, except farm types) and tractor-mounted equipment.

Agricultural Limestone The Monday afternoon session for agricultural - limestone producers was presided over by P. E. Heim, sales manager of the agricultural-limestone department of the Carbon Limestone Company, Youngstown, Ohio. He introduced the first speaker, Donald W. Aitken, Division of Special Programs, Agricultural Adjustment Administration, Washington, whose subject was *The Program of the Agricultural Adjustment Administration for Stimulating the Use of Agricultural Limestone in* 1944. Mr. Aitken said that the A.A.A. is completely on a war footing and that the production of food and anything contributing to its production is considered a vital part of the war effort. The production of food in 1943, he said, was 50 per cent. over that in any year during the last war and the 1944 production is expected to be even greater. Planned quantities of various important foods are being aimed at and the elimination of erosion and the liming of soils are important parts of the program.

Mr. Aitken referred to a map to

illustrate the amount of agricultural limestone now being produced. In spite of the fact that over 20,000,000 tons of this material is now being used annually, compared to about 4,000,000 tons before the A.A.A. program was begun, there are still vast agricultural areas where little or none is used. He said that farmers should actually be using double the present amount of liming materials or about 40,000,000 tons annually. There is, he said, still much educational work to be done and the A.A.A. is making every effort not only to increase the use of this material but also to increase its production. Producers are being given every aid in obtaining the necessary equipment and farmers are being given higher pay for conservation practices, etc. Nearly every producer, said Mr. Aitken, has more orders than he can fill. The A.A.A. is encouraging the expansion of this industry as much as possible through increasing the output of existing producers rather than establishing new plants and is also trying to put both the production and the consumption of this material on a year-'round basis.

In the ensuing discussion W. H. Margraf (Marble Cliff Quarries Company, Columbus, Ohio) pointed out that under present regulations the farmer will either have to do the spreading or pay for it himself unless he can take it out of other payments for terracing or other conservation practices.

Mrs. Paul M. Nauman (Dubuque Stone Products Company, Dubuque, Iowa) said that the farmers in the area served by her company do not have the labor to do this spreading and are willing to pay almost any amount if someone will do it for them. The hauling and spreading in this area, she said, had been done by truckers who are almost all now in the army.

Edward M. Clark, Munnsville Limestone Co.; F. O. Reidy, Kennedy-Van Saun Manufacturing & Engineering Co.; and C. A. Munz, Eastern Rock Products, Inc.

Earl L. Dingle (Harry T. Campbell Sons Corporation, Towson, Maryland) said that his company had the same problem and at least partially solved it by making arrangements with farmers to ship the material by railway to points from which the farmers would haul it in their own trucks. Comments from others present indicated that many other producers from various states are confronted with the same problem.

Dr. P. H. Groggins, chief of the Chemicals and Fertilizers Branch, Office of Materials and Facilities, War Food Administration, Washington, spoke on *Efforts Currently Being Made By the War Food Administration to Expedite the Production of Agricultural Limestone.* He said that every effort is being made to keep producers informed of the latest government activities in this field and urged everyone not receiving the various publications of his department to write either to him or to Mr. Boyd at association headquarters in order to be put on the mailing list. The chief aim of his department, he said, is to help producers to obtain the equipment they need to meet the goals set for them.

Dr. Groggins said that the advance estimates of the Bureau of Mines show a considerably larger production of agstone than the A.A.A. figures, probably due to the fact that these figures also include distribution by producers through their own channels. He said that his department also regards agstone as an essential product and as a permanent market which will continue to expand after the war is over. He pointed out that in spite of the fact that the industry is a profitable one and that there is no sales resistance, underproduction still exists. His department, he said, would much prefer to have any increase in production come from those already in the business instead of from newcomers who would have to open new deposits and build new plants. He suggested that producers look over idle plants and try to integrate some of them into the production program.

According to Dr. Groggins, labor and trucks are now the major problems confronting the industry and the department will be glad to help any producers on these. He said that only 80,000 new trucks will be available in 1944, but that thousands of used trucks employed in the construction of war plants and projects will be on the market. Essential industries, including agricultural-limestone production, will be permitted to buy some of these.

Many war plants are shutting down and the completion of many construction projects will make a certain amount of labor available during the year, the speaker said. He suggested that each producer advise the A.A.A. how much agstone he can produce as a guide in planning future programs. Other efforts being made by the department to stimulate agstone production include making available a large number of limestone spreaders and an attempt to have truck drivers put on the essential list for draft deferment. Fertilizer and insecticide workers, he said, have already been declared essential. In closing he repeated that the department will make every effort to solve any local problems which may develop and said mutual co-operation is the only way to achieve the desired goal.

Price Regulations Pertaining to the Sale and Distribution of Agricultural Limestone was the subject discussed by Henry A. Huschke, Fertilizers and Insecticides Branch, Office of Price Administration, and formerly of the National Lime Association. He first briefly explained the scope and functions of this organization, which covers not only these products but also all the materials entering into their manufacture. In reviewing the history of price control up to the time of the establishment of ceiling prices in 1942 he said that special provisions had since been made to relax the maxima on agstone prices but that these had boosted the government-paid price above that received for other sales. Mr. Huschke pointed out that there are three ways to determine the price a producer can ask under the General Maximum Price Legislation which has been in effect since early in 1942. These are: (1) The highest price received during March or April, 1942, for bulk material f.o.b. the plant; (2) if an Amendment 9 adjustment has been made, this can be extended to all sales; (3) by adding to the average 1941 price the difference between the 1941 cost and that of the six-month period ending in April, 1942. There is, he said, no floor on the price structure.

If the third method is used, said Mr. Huschke, the old and new maximum prices must be submitted to the O.P.A. for inspection but not approval. Any reasonable system of figuring costs can be used by those producers who make other products simultaneously with the agricultural

limestone. All the above, he said, concerns only bulk material; users of bags can add 25 cents per ton plus the cost of the bags. Railroad shipping costs, if any, and the cost of spreading, if this is done, can also be added. A trucker or retail dealer who purchases agstone for resale can add a reasonable margin over the cost plus any of the above-mentioned costs which may enter. A new producer, said Mr. Huschke, must adopt the same price as his nearest competitor and must submit it to the O.P.A.

Mrs. Nauman asked what could be done when a producer who had been making agstone from stockpiled rock ran out of this material and had to start quarrying it. Mr. Huschke replied that a maximum of 30 cents per ton could be added to the price and that the O.P.A. must be informed of this increase. If the maximum increase is not sufficient, he said that an appeal can be made to the O.P.A. but that this procedure would involve many complications.

Another producer said that limestone for agricultural use had always been made in his plant but that now additional equipment is being installed to increase this production and there is no way of knowing how much this will increase the cost of production. Mr. Huschke said that in a case of this kind a careful estimate would probably be acceptable.

Another producer said that he would increase his agstone-producing capacity at once if he could get 30 cents per ton over his present price. He said that small new quarries opened in his vicinity are getting as much as 85 cents per ton more for their agstone than he is permitted to charge. Others cited similar cases.

In answer to questions regarding the fineness to which agstone should be ground, Mr. Aitken said that this is left to the agricultural experts in the different sections of the country. It varies, he said, from 100 per cent. through 20-mesh to 90 per cent. through 8-mesh in most sections but that the latter is nearest the average requirement. Mr. Huschke said that his department would like to see one standard and one price for the whole country but that it was not deemed advisable to force this over the existing standards which are accepted by the farmers, universities, etc., in each area.

Railroad Roadbeds A well-attended session on Tuesday morning heard an address by G. M. Magee, Research Engineer, American Railway Engineering Association, on *Developments in Railroad Roadbed Construction.* In commenting on the excellent wartime performance of American Railroads, Mr. Magee pointed out that passenger traffic today is up 300 per cent. and freight traffic 60 per cent., over 1929 levels, despite the fact that fewer locomotives and cars are now available.

With new rails and ties often unobtainable for replacement purposes, Mr. Magee stated that ballast is being more widely used for maintenance work, and that the results are generally excellent. Two important ballast problems now being studied by engineers are the extent of pulverizing and the extent of fouling from dirt, cinders and other causes. Mr. Magee described a test now in progress in which an asphalt filler was applied over the ballast to prevent fouling. A moving picture was shown to illustrate the method of application. It will be some time before any conclusions can be reached concerning the effectiveness of this procedure.

While many materials such as oyster shells, cinders, slag and sand, are commonly used for railroad ballast, Mr. Magee gave as his opinion that the most satisfactory results are obtained when the best grade of hard, tough stone is used.

It is Mr. Magee's opinion that passenger traffic on American railroads will continue at a high level after the war, and that the postwar prospects for the railroads are correspondingly bright.

Wage Controls R. S. Smethurst, counsel for the National Association of Manufacturers, spoke next on war-time control of wage and salary increases and decreases. According to Mr. Smethurst, the plethora of headaches that have grown out of the Wage Stabilization Act are directly attributable to the statute's provision authorizing the President to make exceptions. There are now, he said, 12 bases upon which wage or salary increases may be permitted: (1) The "Little Steel" formula; (2) to correct existing sub-standard rates; (3) to eliminate gross inequities; (4) to aid the war effort; (5) promotions; (6) merit or length-of-service increases; (7) to equalize rates paid to male and female employees; (8) increases based on incentive or piece-work systems; (9) increases to bring rates up to 40 to 50 cents per hour minimum; (10) incentive increases to promote the production of war material; (11) increases to apprentices upon completion of training; and (12) indirect increases, such as vacation bonuses.

J. C. Farrell and W. E. Farrell, Easton Car & Construction Co.

Mr. Smethurst criticized the National War Labor Board's policy of granting increases without giving consideration to the employer's ability to pay. Additional hardships are imposed upon employers by the granting of retroactive increases. He also took issue with the board's assumption of authority over both war and non-war businesses, and he predicted that the board would survive during the transition period following the war.

In reply to a question from the floor Mr. Smethurst stated that W.L.B. approval is required for any decrease in wages or salaries under $5,000 per year. Violations of this provision incur the same penalties as those that apply to unauthorized increases.

Earnshaw Elected President The remainder of the session was devoted to the election of officers for the forthcoming year. Fred O. Earnshaw (Carbon Limestone Company, Youngstown, Ohio) was elected president to succeed William M. Andrews. William E. Hilliard (New Haven Trap Rock Company, New Haven, Connecticut) was re-elected treasurer.

F. W. Schmidt, Jr. (North Jersey Quarry Company, Morristown, New Jersey) was elected eastern regional vice-president to succeed Mr. Earnshaw. The other regional vice-presidents remain in office. The executive committee for 1944 is composed of the following men: F. O. Earnshaw, chairman; William M. An-

drews; G. A. Austin; L. J. Boxley; Otho M. Graves; Russell Rarey; W. F. Wise, and A. L. Worthen.

Newly elected to the board of directors were Milo Crouse (T. & M. Stone Company, Utica, New York), E. Eikel (Servtex Materials Company, New Braunfels, Texas), M. E. McLean (East St. Louis Stone Company, East St. Louis, Illinois), and E. K. Webster (Pekin Stone Products Corporation, Lockport, New York).

Representing the Manufacturers' Division on the board will be Milo A. Nice (Hercules Power Company, Wilmington, Delaware), J. Harper Fulkerson (Cross Engineering Company, Carbondale, Pennsylvania), and L. W. Shugg (General Electric Company, Schenectady, New York).

The General Electric Company's *House of Magic* was presented at a general luncheon meeting on February 1. The show is currently being presented at army camps and naval bases throughout the country.

In a rapid-fire series of demonstrations performed with clock-work precision, the audience was introduced to the bewildering effects obtainable with modern electrical equipment. Particularly interesting were the demonstrations employing stroboscopic light to stop motion, and the cathode ray oscilloscope which makes it possible to "see" sound.

The audience was privileged to see in operation the first "light-operated" motor in history. Running on electrical energy generated by light falling on photovoltaic cells, the phenomenon is still in the laboratory stage, but the future possibilities suggested by it are truly breath-taking.

Selling Problems Engineering Director Goldbeck opened a group meeting for salesmen on Tuesday afternoon by presenting a summary of the short course for salesmen given in Washington January 27, 28 and 29.

Outlining the objectives of the course, Mr. Goldbeck stated that there is an increasing need for crushed-stone salesmen to become acquainted with the technology of their material, and to be able to answer questions concerning the quality of the product compared with other materials. Since the salesman must sooner or later discuss with his client the question of cost, it follows that he should be familiar with the basic conceptions involved in the calculations of costs of finished mixtures.

With this in view the initial short course for salesmen was authorized by the association to serve as a trial for the purpose of determining if it could be made of real value to crushed-stone salesmen. The course as presented covered the following subjects:

1. The classification of rock, their general nature and geographic distribution, including the igneous, the metamorphic and the sedimentary rocks.
2. The physical characteristics of rocks in each classification.
3. The ways in which rock is tested to determine its physical characteristics, such as the various abrasion, hardness, toughness and soundness tests.
4. The methods of measuring stone sizes, embracing such matters as standards regarding sieves and screens, methods for making sieving tests and for expressing gradation, the meaning and use of fineness modulus, and the effect of gradation on the percentage of voids.
5. The difference between "true," "apparent" and "bulk" specific gravity, and the use of specific gravity for calculating solid volume.
6. Fundamental facts concerning concrete, including how to calculate the proportions of concrete with different aggregates to obtain a required compressive strength, and how to use such calculations to determine cost.
7. Fundamental facts about concrete highways and the forces which they must resist, and the relative merits of different coarse aggregates for highway construction.
8. Manufactured stone sand, its physical characteristics and effects on concrete.
9. Aggregates for use in bituminous road construction and in bituminous concretes, including the effect of gradation and of the physical properties of aggregates on the quantities of bitumen to be used in surface treatment.
10. Railroad ballast and how it is tested and graded. The effect and value of sub-ballast, and the relative merits of various kinds of ballast for track construction.

Following Mr. Goldbeck's summary the remainder of the meeting was devoted to a general discussion of the course and how it might be improved. It was unanimously felt that the first course had been of

New York Trap Rock Delegation

LEFT TO RIGHT: (kneeling first row): G. Tomlins (Superintendent, Haverstraw Quarry); G. Foster; J. Jorgenson; J. Pearce; G. Ceroni; J. Howard and W. Elliott (Department Public Works, New York); H. McDermott; (kneeling second row): G. Hoepfner; R. Moloney; General Superintendent J. Taylor; G. Smith; C. Leroy; A. Bova; H. Spies; F. Ceroni; (standing first row): W. P. Foss, chairman of the board; W. Moore; T. Regan; C. McElroy; W. McHenry; superintendent Tomkins Cove quarry; J. Restein; L. Miller (assistant general superintendent); J. Devlin; T. Bowen; Dr. L. D. Long, Newark Testing Laboratory; J. Finegan; D. Bracken; (standing second row): F. Buffington; G. Royal; J. Fitzpatrick; T. Kelleher, superintendent Verplanck quarry; F. Brannan; C. Stenz; A. Benson; R. Coy, superintendent Clinton Point quarry; G. Kelleher; J. McPartlan; J. Brady; L. Cudahey; vice-president J. Dooley; chief engineer M. C. Dow; G. Boyce.

S. H. Fulkerson and J. Harper Fulkerson, Cross Engineering Co.

vast benefit to those who attended it, and that the practice should by all means be continued.

At the close of the meeting a motion picture was presented showing sales techniques that sell.

Operating Men Meet The Tuesday afternoon meeting for operating men and equipment manufacturers was presided over by T. C. Cooke, president of the Lynn Sand & Stone Company, Swampscott, Massachusetts. He introduced the first speaker, L. C. Bibber, welding engineer of the Carnegie Illinois Steel Corporation, Pittsburgh, whose subject was *Welding—A Friend in Need*. Mr. Bibber briefly described the fundamentals of welding and stressed the importance preheating plays in the treatment of different types of metals for different uses.

This was followed by a floor discussion of this and other subjects of importance to plant operators who are trying to keep their plants going in spite of the limitations imposed by war. In response to a question Mr. Bibber stated that preheating must be done under accurate control if the best results are to be obtained. Thermometers or some other accurate means of measurement are recommended.

The subject of diminishing man power brought from those present many comments which indicated that this subject was of great current interest. J. Q. Taylor (New York Trap Rock Corporation) said that the draft alone had taken more than 100 men from the company's four plants or about the equivalent of the personnel of one plant.

In discussing tricks of the trade one operator described an airblast system used to remove dust from stone being loaded for shipment. Air from a perforated vertical pipe beside each chute is blown horizontally across the falling stream of stone while a vertical screen section on the opposite side of the chute prevents any loss of stone. This system is used only when necessary and then only for the larger sizes of stone.

Mr. Taylor then described the methods used by his company to wash all the stone produced. He also described the "barney car" system used at one of the company's plants to boost loaded truck-trailers out of the quarry. This system has been described several times in these pages, the last time in the April, 1943, issue.

In discussing the co-operation received from equipment manufacturers in keeping their equipment operating efficiently there was almost a violent difference of opinion and experience. Some said that sales representatives never put in an appearance after the original sale is made. One operator said that he had bought a number of shovels from one company over a period of years because a representative would check in at regular intervals, but that since the war began these visits had been discontinued.

One machinery company representative said that there is a definite limit to the amount of service a manufacturer can give on a machine at the price it is getting for it. There are also many operators, he said, who will not take advantage of the experience and advice of a sales engineer when it is offered. One producer apparently voiced the opinions of most producers and salesmen when he said that the best way is for the producer to call in the machinery manufacturers' representatives when trouble develops. Many plant workers, he said, resent having an outsider come in and criticize them and, besides, most troubles develop quickly and would not have been apparent even to an expert a few days earlier.

J. A. Lawrence (Liberty Limestone Corporation, Rocky Point, Virginia) said his company had solved this problem to some extent by installing small time clocks on each unit to record the time periods during which it is actually operated. Knowing the approximate life that can be expected from each machine or its parts makes it possible to be ready for trouble when it does develop. The ammeter for each machine is marked at the normal full-load reading, and when it exceeds that mark a careful check is made to find the reason.

A. B. Rodes (Franklin Limestone Company, Nashville, Tennessee) said that a similar check can be made on tires. The tire manufacturer's estimate on tire life for given conditions is used for a guide and when a tire falls very far short of attaining that mileage a reason is sought. This might be carelessness on the part of a driver, rock-strewn quarry roads, or some other preventable cause.

Safety Trophies Awarded Highlights of the annual banquet on Tuesday evening were the presentations of awards in the National Crushed Stone Association safety competition for 1942. The safety trophy, a bronze plaque, was presented to the Tomkins Cave quarry of the New York Trap Rock Corporation, where 192,000 manhours were worked in 1942 without a lost-time or disabling injury to any employee.

Honorable-mention awards, consisting of parchment reproductions of the bronze plaque, went to thirteen plants with accident-free records.

Major George Fielding Eliot, military analyst for the Columbia Broadcasting System, was guest speaker at the banquet. Presenting an analysis of the war situation as it exists to-day, Major Eliot stated that in his opinion the war in Europe can not possibly end until the United Nations have made a successful invasion of the mainland, apart from the front already established in Italy.

Questioned from the floor, Major Eliot expressed doubt that German morale will collapse until allied troops have actually entered Hitler's empire. He regards air bombardment as a necessary but not conclusive means to this end.

Wage-Hour Problems L. Metcalf Walling, Administrator, Wage and Hour and Public Contracts Division, of the United States Department of Labor, discussed the *Application of the Walsh-Healey and Wage-Hour Acts to the Crushed-Stone Industry*. In opening he referred briefly to the history of the seasonal exemption granted to northern producers of crushed stone and sand and gravel from the hour provisions of the Fair Labor Standards Act, as the result of which producers in the northern states, wherein the cold weather of winter

prevents year-'round operation and requires the working of longer hours in the summer, are permitted to work their employees up to 12 hours a day or 56 hours a week for a period of 14 weeks in each year. Other plants, not located in the northern area, were granted the same exemption, wherever local climatic conditions required them to follow the same operating pattern as northern plants. Twelve companies in the crushed-stone industry and four in the sand-and-gravel industry have been granted special exemptions.

The new 40-cents-an-hour minimum-wage order, under which the crushed-stone industry has been operating since December 27, 1943, was mentioned by Mr. Walling. He spoke, too, of the widespread belief that high wages are now, because of the war, universal. As evidence of the erroneous belief that $16 pay for 40 hours is sufficient for a family man in these times he cited the action of the Stone, Clay and Glass Industry Committee, seven of whose eight members voted against the imposition of the 40-cent minimum. Newspapers and magazines in all parts of the country, he said, had given wide publicity to the payment of high wages in certain industries and have left the public with the impression that such high wages are not common but almost universal, and he had looked in vain, he added, for some corrective comment in the correspondence columns of those periodicals in the form of letters from employers who are aware of the low wages still being paid in many industries. His listeners were urged to contribute some truthful evidence on this subject in cases where they are fully aware of the facts, so that the public will not be dependent solely on labor unions and the government for the truth.

The speaker said that the action of the Stone, Clay and Glass Industry Committee was unusual in that it was the only committee, of all those who have made industry-committee recommendations with respect to wage rates since 1938, that did not vote in favor of raising the minimum rates in existence. In 83 per cent. of the committees, he said, a majority of the employer representatives had voted for the recommended rate and in another 2 per cent. of the committees the employer members stood half for the increase and half against it. In over half of the 113 cases the employer, employee and public representatives on the committees had voted unanimously for the recommended rates.

This high percentage of employers in favor of the minimum wage rates recommended is interpreted by Mr. Walling as meaning that a large number of employers and trade associations support the philosophy behind the Fair Labor Standards Act in so far as it relates to wage rates. He said that the law aimed at providing greater prosperity for the country as a whole—for capital, management, and white-collar workers and not alone for labor.

Mr. Walling quoted a statement of one of the committee members representing the crushed-stone employers, who argued against the adoption of the proposed minimum rate, in support of the philosohy of the act which provided for a gradual increase of wage rates up to the 40-cent level. This employer had said, according to Mr. Walling, that crushed-stone prices are set by the economic conditions of the localities in which the product is used, and that they tend to rise in areas that are wealthy and prosperous and to drop in areas that are not. He considered this statement a strong plea for the gradual increase of wages above starvation levels, as it was an acknowledgement of the dependence of crushed-stone producers and other business men on a high level of prosperity.

The speaker painted a prosperous future for the crushed-stone industry after the war. He characterized the period as a "post-war boom" which would benefit not only the crushed-stone industry but the entire construction field. He drew the reasons for such an expectation from the plans of private industry, the deferred and rapidly accumulating demands for new housing facilities, and the post-war program of local, state and federal government agencies. His listeners were asked whether they did not want the coming boom to last, and predicted that it would amount to no more than "the false breath of spring in February" if, while the armed forces being demobilized, wages should be cut down to the point that makes it impossible for the general public to buy the products of industry. He believed, he said, that wise employers in all lines of business would voluntarily provide wages that would enable their workers to buy the products—housing and other types of construction—on which the crushed-stone industry depends.

Mr. Walling gave a brief account of the ways in which the divisions operating under his direction are helping other government agencies, such as the National War Labor Board, in functioning under the greatly increased strain placed upon them by the war without comparable increases in staffs. He mentioned some of the benefits that have accrued to business men from the combination of the Wage and Hour Division and the Public Contracts Division in a single unit, as the result of which the number of contacts with business men for investigations of plant conditions, wage-and-hour compliance, and so on is greatly reduced.

Damage from Blasting Speaking on *Modern Methods of Investigating Alleged Damage from Blasting,* Dr. L. Don Leet, associate professor of seismology, Harvard University, said at the outset that claims for damage allegedly due to blasting have degenerated into a racket, and that most of them are fraudulent. He said great progress had been made in the technical procedures for ascertaining the facts, and that the seismograph gives precise and accurate records of vibrations.

He illustrated his remarks by frequent sketching on a blackboard, showing first the principle on which the seismograph operates. From the horizontal leg of an inverted L-frame he suspended by a coiled spring a weight, which he attached to a horizontal beam anchored to the vertical leg of the frame. A pointer attached to the weight and free to move up and down marks a chart that shows the extent of the vibrations to which the earth is subjected by a given blast.

Dr. Leet spoke also of the seismometer which makes use of falling pins, which, being of various lengths, fall over from their vertical positions in accordance with the different types and degrees of vibration. If all the pins should remain standing, the vibrations being measured are too slight to damage any structure.

The speaker said that less than one-tenth of 1 per cent. of the power of the blasing explosive goes into the ground, and that waves of small magnitude, if of proper frequency, can be felt by human beings. Of five types of waves he described and illustrated two, "body waves" which pass through the ground and surface waves. Surface waves, he said, disturb the ground below the surface to a depth of one-half the length of a wave, which ranges from 100 to 300 feet.

He spoke of the "foundation coefficient," which is the ratio of the upward push of vibrations in soft material to that in rock and in some materials may be as high as 10.

Another large delegation attending the convention was that of the General Crushed Stone Company.

The waves of vibration lose their energy rapidly in unconsolidated material, according to Dr. Leet.

Inefficient shattering results in less residual energy for spreading vibrations, and it is possible to obtain more vibrations from less dynamite. The air-borne concussions are so slight, the speaker said, that there is no resulting damage to structures.

Dr. Helgi Johnson, professor of geology at Rutgers University, said that some of the damage to structures allegedly due to blasing is caused by talus, the slope of rocky fragments which lies at the base of a cliff or precipitous rock and has been formed by the accumulation of pieces brought down from above by the action of gravity, rain, frost, etc. The movement of talus frequently causes a downward sliding of structures built on hillsides and the cause may be believed to be blasting. Earth pressure often amounts to several hundred thousand pounds per square foot, and is responsible for most of the damage attributed to blasting, Dr. Johnson said.

In answer to a question Dr. Leet said that repeated blasts do not produce a cumulative effect. If each individual blast produces vibrations that are within the strength limits of a structure, repeated blasts will not produce ill effects.

Post-War Planning The Wednesday afternoon meeting was presided over by A. L. Worthen, vice-president of the New Haven Trap Rock Company, New Haven, Connecticut. The first speaker, James J. Kelly, president of the Contractors' Division, American Road Builders' Association, chose as his subject *Shall We Win the War Without Winning the Peace?* Mr. Kelly began by giving a brief outline of the post-war highway program proposed by the association and of others which are projected, saying that these should take the place of any make-work or other relief programs which might be proposed.

According to Mr. Kelly, estimates of post-war private construction run as high as $5,000,000,000 annually but that considerable variation is bound to occur from year to year. He suggested that public-construction volume be controlled in such a manner as to level off any variations in private-construction volume so that the total volume will be kept at a high and fairly even level. He said that the American Road Builders' Association studies showed that from 12 to 15 per cent. of the national income must be spent for construction work in order to prevent another depression and that most leading economists agree with this estimate.

He warned that the Public Works Administration is another potential W.P.A. and said that the association believes that all construction should be done on a contract basis. Association studies, according to Mr. Kelly, showed that roads built by municipalities cost, on an average, 18 per cent. more to build than the contractors had bid on them. He said that a $100,000,000 highway program would give a year's work to 100,000 men, and would require the expenditure of $16,700,000 for equipment and $33,480,000 for materials.

Mr. Kelly mentioned some of the more important post-war construction projects already contemplated, including a trans-continental 34,000-mile network of superhighways. The state of Pennsylvania alone, he said, has a $500,000,000 backlog of highway construction and many other states and cities also have large programs planned, many of which have already reached the blueprint stage. It is also significant, said Mr. Kelly, that many of these estimates are being steadily increased. In closing he said that the A.R.B.A. would welcome any help that producers can give to get this program organized for their common benefit.

The *Development of New York's Post-War Highway Program* was discussed by C. H. Sells, Superintendent of Public Works, New York State, who recently returned from a 13-month stay in Iran, where he was in charge of the construction of the $16,000,000 highway which is bringing vital supplies to Russia. Mr. Sells said that post-war planning is in a sense war work as the knowledge that work is awaiting them is a wonderful morale builder for our soldiers and sailors. He also said that many communities in the state are far behind their building needs and have built up a huge backlog of work to be done. The state has provided a fund of $3,500,000 to pay for the planning of construction projects by the state, counties, and other political subdivisions, and a commission will analyze each project from the standpoint of cost, labor and material requirements. All these projects are submitted to the state supervisor of public works for approval and must then be inspected by various state departments, such as finance and labor. Up to January 1, said Mr. Sells, 3,407 proposals had already been received on projects totaling $327,800,000. These included 1,471 street and highway projects as well as sewer, water, schools, etc. Of the total, 1,149 projects have already been approved, including 652 highway projects.

Cement, Gypsum Firms Safety Record Cited

The following companies have been cited by the Buffalo Safety Council for exceptional safety records in the final quarter of 1943:

Lehigh Portland Cement Company's Buffalo plant, Certain-teed Products Corporation's Buffalo and Akron plants, Louisville Cement Company's Akron plant, Niagara Gypsum Company's Akron mine, Clarence Center mine and plant, Universal Atlas Cement Comany's Clarence Center plant.

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Agricultical-Stone Producers Meet in Springfield, Illinois

PRODUCERS of agricultural limestone in middle western states met on Washington's birthday in Springfield, Illinois, for the annual meeting of the Midwest Agricultural Limestone Institute. After re-electing the old officers—E. J. Krause, president; Dan Sanborn, vice-president; Floyd Mumma, secretary; and Harry A. Clark, treasurer — those present discussed the problems that confront liming-material producers in Illinois, Iowa, Missouri and Wisconsin. The following new directors were elected: North: William J. Stoffel and Weir H. Traver; East: Charles E. Stimming (succeeding Colby Armstrong, who is now in the Navy); Central: Dan Sanborn; South: E. J. Krause and William E. Hewitt; West: R. S. Quell. It was decided to use the secretary's home address, 1451 West Sunset Avenue, Decatur, Illinois, as the official address of the institute.

During a discussion of prices it was brought out that at least two producers of agricultural limestone in the Chicago area have obtained price relief from the Office of Price Administration to the extent of 30 cents a ton based on increased manufacturing cost due to the installation of new equipment needed to produce the material as a primary product. When price relief is sought in cases in which the producers have been estopped from setting up increased wage rates as the basis for higher prices, it may be possible to show that, in spite of the stability of those rates, the labor-cost element in the total production cost has risen because of the reduced output of new, inexperienced and elderly workers.

It was said that one producer during 1943 had turned out and sold more than 500,000 tons of agricultural limestone at a price of $1.25 a ton. One Iowa producer was reported to have a contract with the Agricultural Adjustment Administration to furnish 700,000 tons of agricultural limestone at $1.65 a ton.

The electrical cost of reducing 1 ton of stone from 1-inch size to agricultural limestone was said by one producer to be 7½ kilowatt-hours with a Diesel-engine generating plant, with which the generating cost was 8½ mills per kilowatt-hour. The cost of purchased electrical power was said by another operator to be about 1½ cents per kilowatt-hour.

The production of agricultural limestone from stock-piled 3-inch stone by the use of portable plants was said by one producer to have been found impractical in his case because he could sell the 3-inch material for a better price than agricultural limestone. His output of the latter material was 19,000 tons last year.

John Spencer, secretary of the Illinois Agricultural Association, said that the production of agricultural limestone in Illinois in 1943 was estimated to have been 3,666,200 tons. Illinois Geological Survey reports showed that 54 producers in Illinois sold 1,356,483 tons in 1943 compared with 1,445,618 tons in 1942, indicating a drop of about 6 per cent. In 1942 134 producers sold 3,866,568 tons, so their 1943 output was placed at 3,666,200 tons based on the same average decrease.

The average CCE test of Illinois agricultural limestone last year was over 90 per cent., according to Mr. Spencer. He said that good limestone should show as high a CCE test as possible, should be at least fine enough so that 80 per cent. of it will pass an 8-mesh screen, and should be spread evenly. He said that the A. A. A. had popularized the use of limestone and that there is a great opportunity to sell it to farmers, who have the money with which to buy it. He said that 30,000,000 tons of agricultural limestone would be needed to lime all the farm and pasture land in Illinois. The outlook for the sale of limestone, he said, was never better.

He said that the farmer wants more limestone but that the producer can not supply it, although some producers are installing new equipment to meet the demand. A great difficulty encountered in trying to supply the farmer's needs is the lack of truckers, many of whom have been taken into the armed forces. These men collected limestone at the producers' plants and then delivered it to and spread it on the farmers' lands.

Those in attendance included the following representatives of producing companies:

Harry A. Clark, Consumers Co., hurst-Chicago Stone Co., Elmhurst, Ill.

George F. Hammerschmidt, Elm-Chicago Stone Co., Elmhurst, Ill.

William E. Hewitt, East St. Louis Stone Co., East St. Louis, Ill.

E. J. Krause, Columbia Quarry Co., St. Louis, Mo.

M. E. McLean, East St. Louis Stone Co., East St. Louis, Ill.

Worth C. Merritt, National Stone Co., Joliet, Ill.

Floyd Mumma, Columbia Quarry Co., Decatur, Ill.

Dan Sanborn, Lehigh Stone Co., Kankakee, Ill.

W. E. Schmidt, Columbia Quarry Co., St. Louis, Mo.

William J. Stoffel, Dolese & Shepard Co., Chicago.

Albert Stotz, Waterloo, Ill.

Weir H. Traver, Elmhurst-Chicago Stone Co., Elmhurst, Ill.

The guests included Stanley A. Phillips, PIT AND QUARRY, Chicago; Nathan C. Rockwood, *Rock Products,* Chicago; N. F. Schwartz, Agricultural Adjustment Agency, Springfield, Ill.; John Spencer, Illinois Agricultural Association, Chicago.

Asphalt Institute Holds First Illinois State Conference

PRODUCERS of aggregates, manufacturers of bituminous emulsions, builders of aggregate-bituminizing plants, highway contractors, road engineers, and state, county and city road and street officials met in Springfield, Illinois, February 23 and 24 to participate in the First Illinois State Asphalt Conference. This gathering, the first of its kind in Illinois and, indeed, the first held in any state, was sponsored among producers by the Chicago Gravel Company, the Columbia Quarry Company, the Consumers Company, the East St. Louis Stone Company, the Elmhurst-Chicago Stone Company, the Lehigh Stone Company, the Lincoln Sand & Gravel Company, the Material Service Corporation, and the National Stone Company, all Illinois concerns. The equipment manufacturers sponsoring the meeting were the Barber-Greene Company, the Cleaver-Brooks Company, E. D. Etnyre & Company, the Hauck Manufacturing Company of Illinois, the Iowa Manufacturing Company, the Jaeger Machine Company, the Kinney Manufacturing Company,

Sly Dust Filter in a Connecticut rock crushing plant for the suppression and positive collection of dust created by crushing, screening and conveying operations. The same filter is shown in the entire view of plant below.

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IN the rock products field, as in the cement field, more Sly Dust Collectors are used than any other make. Such popularity is the result of the greater advantages Sly offers.

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Why SLY

1. Greater filtering capacity because of more filtering cloth.
2. Taut bags (patented) save power and improve dust removal.
3. Bags more easily replaced.
4. Automatic control (any degree) minimizes or entirely removes the human factor.
5. Simpler shaker mechanism results in savings in maintenance and operation.

the Pioneer Engineering Works, and the Simplicity System Company.

The two-day sessions were opened by addresses of welcome by H. B. Pullar, the general chairman; Walter A. Rosenfield, director of the Illinois Department of Public Works and Buildings; and Herbert Spencer, president of the Asphalt Institute and for many years head of the asphalt department of the Standard Oil Company of New Jersey. Mr. Rosenfield said that the counties of Illinois are beginning to schedule their post-war work for secondary—farm-to-market—roads. Mr. Spencer pointed out that the Asphalt Institute, during its 25 years of existence, had held conferences for 20 years and is the only organization devoting all its time and effort to the uses of asphalt. He said that institute engineers had given advice to army engineers in airport design in such widely separated areas as Iceland, Greenland, the Caribbean Sea, and so on. He spoke of the institute's laboratory work, research, and educational work in the field of specifications.

For the most part the addresses dealt with technical problems involved in the use of asphalt in paving. Thus, Bernard E. Gray, engineer of the Asphalt Institute, discussed the *Construction and Resurfacing of Primary Highways,* while W. W. Polk, chief highway engineer, Illinois Division of Highways, spoke on the *Construction and Resurfacing of Illinois Primary Highways.* The Institute's chemical engineer, Prevost Hubbard, talked of *Soil Bearing Tests and Flexible Pavement Design.*

Four county highway superintendents were on the program with individual addresses. A. R. Carter of Winnebago County discussed *Surfacing Macadam Base with Sub-Class A-1 Surface Treatment;* H. A. Kluge of Madison County spoke of the *Treatment of Earth Roads with Road Oil and Asphalt;* R. M. Lobdell of Lake County talked about *Surfacing Gravel Bases with Sub-Class C-6 Plant Mix;* and B. C. McCurdy of St. Clair County dealt with financing in an address entitled *Bonds vs. Pay As You Go.* J. A. Williams, commissioner of Public Works, Glencoe, Illinois, told about *Maintaining City Streets with Sub-Class A-2 and Seal Coats,* and *General Aspects of Asphalt Work with MFT Funds* formed the subject of an address by George H. Baker, engineer of county roads and city streets, Illinois Division of Highways.

The last session was devoted to an asphalt forum which covered such subjects as airports, construction methods, technical problems, contractors' operations, federal projects and surface treatments. The consultants in these discussions included H. E. Horner, Civil Aeronautics Administration; W. R. Macatee, Prevost Hubbard and Bernard E. Gray of the Asphalt Institute; W. L. Hempelmann, the Texas Company; J. F. Gallagher, Gallagher Asphalt Company; Howard Bridges, Bridges Asphalt Paving Company; E. F. Kelley, United States Public Roads Administration; Ray Ellison, Ellison Road Construction Company; and others.

A. I. M. E. *(from page 90)*

brought forth much discussion. It was illustrated with diagrams and photographs of test models which showed that only material in the cone of flow will move when material is being withdrawn from a bin. For calculating this cone of flow he gave a formula which he said can be applied to almost any type of material. The basis for all his calculations is the angle of rupture of the material rather than the angle of rest on which most previous work on this subject has been based. Mr. Shallcross also described the application of his formulas to stope mining and to the arrangement of chutes in order to give preference to the material in one of two chutes without clogging them.

Several other papers of interest to nonmetallic-minerals producers were presented at other meetings. Several of these were read at the meeting of the Milling Methods Division as part of a Flotation-Machine Symposium which was presented Tuesday morning and afternoon. Of particular interest was *Froth Flotation of some Nonsulphide Minerals of Strategic Importance* by S. A. Falconer and B. D. Crawford, Ore Dressing Laboratory, American Cyanamid Company. The methods used for the efficient separation of such minerals as fluorspar, spodumene, mica, feldspar, kyanite, garnet, gypsum, magnesite and diatomite were described.

In *Flotation Machines at the Tennessee Copper Company,* J. F. Myers and F. M. Lewis of that company described the flow-sheet used and gave the reasons for the selection of the various types and makes of machines used in the various departments.

Mechanics of Nonmetallic Flotation, prepared by J. A. Barr, chief engineer of the International Minerals & Chemical Corporation, and read in his absence, described the use of flotation in the production of graphite in Alabama during the last war. The author told about tests which were made on Tennessee phosphate ore in 1927 and led to the formation of the Phosphate Recovery Corporation which holds patents on the flotation of that material. The first such installation, he said, was made in 1928 at the corporation's Mulberry, Florida, plant. He described the improvements in these processes as flotation was successively installed in later plants, the newest being the Peace Valley, Florida, plant which is one of the newest and most important operations in this industry. He also described interesting installations of these methods in the plant of the Kyanite Products Corporation at Baker Mountain, Virginia, and at International's potash plant at Carlsbad, New Mexico.

Rehandling at the stock-piles is one of the tasks performed by this Lima Paymaster drag-line at the plant of the Davis Sand & Gravel Company at Anacostia, D. C. The machine is equipped with a 50-foot boom and is powered by a Buda L-525 gasoline engine.

PERSONAL MENTION

GEORGE C. WALTER, president of Southern Cement Company, Birmingham, has been named chairman of the industrial division for the 1944 Jefferson County Red Cross war fund drive.

WALTER SMITH has purchased the interests of HOWARD MARKGRAF and ANTON KRAFT in the Princeville Stone Company, Princeville, Illinois, and is now the sole owner.

LIEUTENANT W. R. BENDY, cement engineer of Claverack, New York, is now flying with the Air Transport Command in India.

H. M. COMSTOCK, for more than 15 years director of sales for the Simplex Products Corporation, Cleveland, has been made engineering sales representative of Kropp Forge Company and Kropp Forge Aviation Company for the Southern California territory.

ALTON P. HALL has been appointed assistant general manager of sales of the American Chain & Cable Company, Inc.

DWIGHT R. MEANS, who has been associated with the Columbia Chemical Division of the Pittsburgh Plate Glass Company for 21 years, has been named assistant to the vice-president.

R. CALVERT HAWS of the Western Precipitation Corporation, has been elected president of the Los Angeles chapter of the National Industrial Advertisers' Association.

EARL HERMANCE was received into the Silver Medal Club of the Universal Atlas Cement Company, Hudson, New York, at a ceremony recently held at the plant. Mr. Hermance entered the employ of the company in 1918 as a telegraph operator and has been continuously employed there and in the shipping department since, also having charge of the telephone and teletype departments.

D. I. PACKARD has been appointed district manager of the Chicago office of the Baldwin Locomotive Works.

DONALD D. KENNEDY, JR., has become a lieutenant (jg) in the Corps of Supply, U. S. Navy. Mr. Kennedy has a long history and experi-

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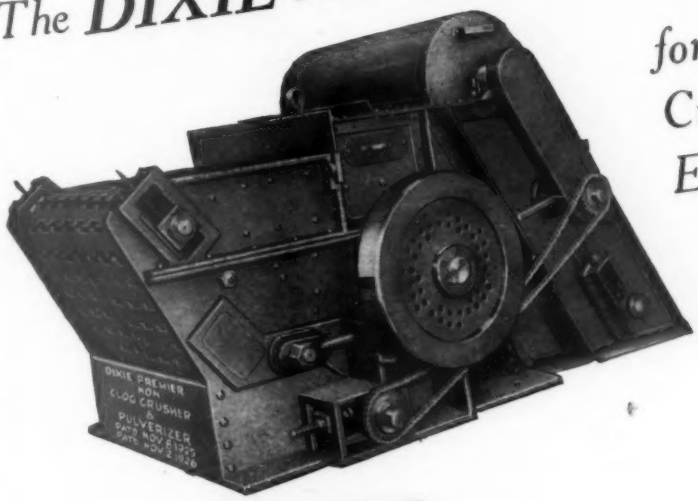
for higher Crushing Efficiency



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You've got to keep up with rapidly increasing demands for crushed rock—a basic need of industry and the armed forces.

The DIXIE Hammermill with its *exclusive* moving breaker plate guarantees continuous high feed and record production on any kind of material handled.

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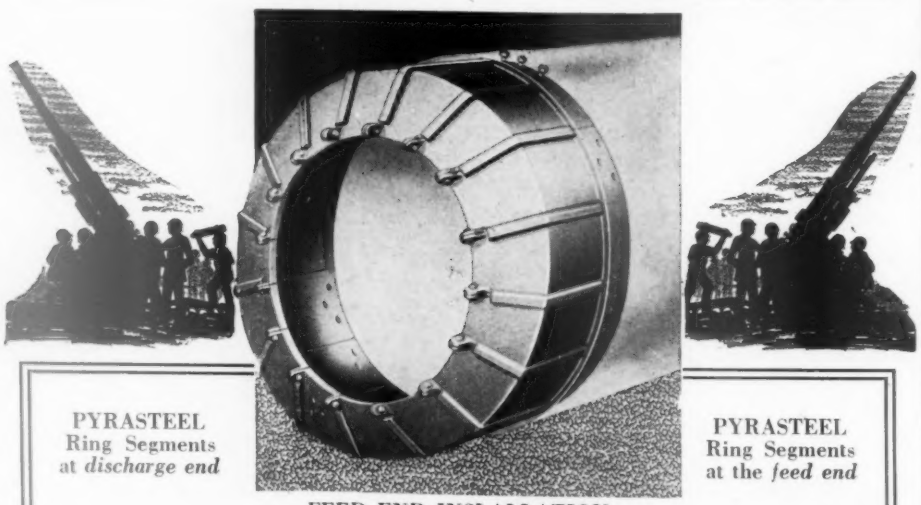

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FEED END INSLALLATION

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ence on the construction field, and was head of the Kennedy-Cochran Company of Chicago, which represented such companies as the Buckeye Traction Ditcher Company, Iowa Manufacturing Company, Carver Pump Company, The Foote Company, Inc., and Worthington Pump & Machinery Company.

OBITUARY

GEORGE CLARENCE HOTEN, 59, employed as engineer for the Louisville Cement Company of Louisville, Kentucky, in its plant near Milltown, Indiana, died recently of injuries received while at work in the plant. He was seriously burned while attempting to thaw out some frozen pipes. He was rushed to a hospital in Louisville where he died.

MELVIN V. PATTISON, 79, chairman of the board of directors of the Industrial Brownhoist Corporation, died February 11 at his home in Bay City, Michigan. He entered the employ of the Brown Hoisting Machinery Company of Cleveland, forerunner of Industrial Brownhoist, as a salesman in 1901.

Legal Decisions

Bill of Lading Clause

Modern higher courts hold that contracts which conform with the tariffs are valid that limit the time in which shippers may file a claim to recover for lost or damaged merchandise. This same rule of law is applicable with respect to other reasonable clauses and provisions in bills of lading.

For example, in Chicago, St. P., M. & O. Ry. Co. *v.* Kileen, 9 N. W. (2d) 616, a common carrier sued a consignee to recover freight charges for the transportation of sand and gravel shipped by Wissota Sand & Gravel Company from its pit. There were in all eighty-eight separate shipments. The carrier furnished its cars at the Wissota Sand & Gravel Company's pit when and as ordered by a construction company, which was the consignee.

Each shipment moved under a separate bill of lading. The bills of lading were made out at the Wissota Sand & Gravel Company's pit by its employes. The cars were receipted for the carrier's agent. On each bill of lading was printed, "re-

ceived subject to the classifications and tariffs. . . .

The consignee defended the suit on the contention that the carrier was negligent and careless in the operation of its railroad and in the maintenance of its cars; that there was actually delivered to the carrier by the Wissota Sand & Gravel Company certain quantities of sand and gravel, but that the difference between the amount received and the amount for which the consignee was billed was lost by the carrier as the result of failure to exercise ordinary care; that there were lost 1,859.25 tons of sand, and 2,039.68 tons of gravel, for which the consignee paid Wissota Sand & Gravel Company twenty-five cents per ton for sand and sixty-one cents per ton for gravel; that by reason of the failure of the carrier to exercise ordinary care in the transportation of the sand and gravel, the consignee sustained damage in the sum of $1,688.81. The consignee argued that the requirement in the bills of lading that a written claim be filed within nine months after delivery of the property, is against public policy and void. However, since the claim was not filed in writing within the nine months period, the higher court held the carrier entitled to a full recover of its alleged freight charges, and also held the consignee not entitled to recover from the carrier the value of the sand and gravel which was not delivered. This higher court said:

"The fact that all shipments in question were intrastate does not change the rule with reference to the necessity of filing a claim or claims in writing within nine months after delivery of the property, as a condition precedent to right of action against the carrier. Undoubtedly, it is the general rule that as to all shipments under a uniform bill of lading written notice of claim for loss or damage can not be waived."

C. O. D. Debtor Liable

No person who receives a C. O. D. shipment without paying the specified amount due may avoid the legal responsibility of payment.

In Truck Owners Freight Company *v.* Polant, 10 N. W. (2d) 473, it was disclosed that a consignor delivered merchandise to the carrier with directions to collect on delivery to the consignee the sum of $157. By mistake the carrier's agent delivered the goods to the consignee without collecting this C. O. D. money. The carrier sued the consignee, and in holding the latter

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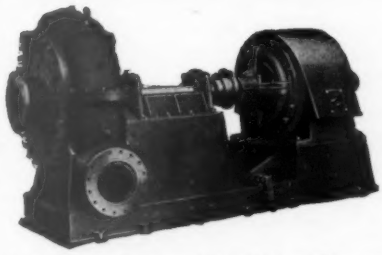
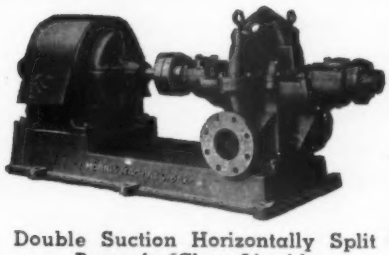
Engineers who have wondered about the origin of this expression may get some idea from the above illustration. This Morris Centrifugal Pump is certainly "full of grit"—literally as well as figuratively. The stamina which has enabled it to operate with complete satisfaction on this difficult slurry-handling service is typical of the quality built into all Morris Pumps: whether used for clear water, chemicals, pulpy or abrasive mixtures.

Have you the Morris bulletins on pumps for your requirements? If not, be sure to write for copies.



Heavy-Duty Lined Dredging Pump



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CENTRIFUGAL PUMPS

bound to pay the carrier $157, the higher court said:

"A consignee who receives a C. O. D. shipment is bound either to pay therefor or return the goods."

Credits on Liens

Generally, a seller must keep accurate books showing exactly to what account payments are made by a purchaser of materials. His failure to do so may result in invalidity of a lien to secure payment for materials. For instance, in *Standard Pipe & Supply Company v. Red Rock Company,* 135 Pac. (2d) 659) a company sold materials and claimed a lien to secure payments for them. Legal controversy developed over the validity of the lien because the seller had not properly credited certain payments by the purchaser. This court stated important law, as follows:

"Ordinarily such credits would be applied on the first items of the account."

Independent Contractor

The term "independent contractor" refers to a person who agrees to perform certain work, or to render a particular service without submitting to control of the employer with respect to the manner of performance of the work. In suits of this nature the jury must consider all testimony regarding control of the employer. Otherwise the higher court will reverse the jury's verdict.

For example, in *Smith v. Ludwig,* 132 Pac. (2d) 735, Washington, it was shown that a person named Smith, brought suit to recover damages arising out of a collision between his car and a truck owned by a company. During the trial the testimony proved that the company employed a driver under a loose working arrangement on a percentage basis. The company had considerable investment in the truck used, bore all the losses and paid for half of the gasoline and oil, and the driver had no equipment to use for others than the company. However, no detailed testimony was given with respect to the degree of control the company officials exerted over the driver.

The lower court held the company not liable on the grounds that the driver is an independent contractor, but the higher court reversed the verdict and said:

"The jury might have concluded that Harold Tuttle (driver) was not an independent contractor."

Motor Carrier Act

Section 204 (a) of the United States Motor Carrier Act provides that certain motor-truck drivers are under the control of the Interstate Commerce Commission. Also, Section 13 (b) of the Fair Labor Standards Act provides that the law is not applicable to employees over whom the Interstate Commerce Commission has power to establish "qualifications and maximum hours of service."

For example, in White, 132 Fed. (2d) 631, it was shown that an employee is employed a part of the time as a distributor and, also, as a motor-truck driver. His duties are such that under the terms of the Motor Carrier Act the Interstate Commerce Commission has the "power" to regulate the hours of employment and wages of this employee. However, the Interstate Commerce Commission did not regulate the number of hours the employee worked nor did it regulate the amount of wages paid by the employer to the employee. The employee sued the employer to recover for overtime wages, for damages and, also, for attorney's fee based upon the Fair Labor Standards Act.

The higher court held that since the Interstate Commerce Commission had the power to establish qualifications and maximum hours with respect to the employee, the fact that the commission did not ex-

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SPACE REQUIREMENTS OF COMPARABLE RECOVERY UNITS
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Relative Space Requirements In Sq. Ft.
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Collector A 2.1 1.8
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In the chart above, the space requirements of the MULTICLONE Mechanical Collector are compared with those of other leading makes of recovery equipment. All figures are based on the same comparable sizes and capacities. Note how the MULTICLONE in some cases saves as much as *six* times the floor space and almost *four* times the room space of other comparable units. Translate these savings into valuable building area and space availability in *your* plant and you have an important reason for selecting the MULTICLONE.

THEN REMEMBER THIS. In the MULTICLONE you do *not* sacrifice recovery efficiency to get compactness. *The* MULTICLONE *will equal—or exceed—the efficiency of any other collector working under the same conditions!*

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ercise this power did not entitle the employee to claim protection of the Fair Labor Standards Act. This court said:

"The real question here is the meaning of the words 'power' in Section 13 (b) of the Fair Labor Standards Act. Congress, we believe, meant the existence of the power not its actual exercise."

Also, see the leading case of Robbins, 44 F. Supp. 867. This court held that if the Interstate Commerce Commission has the power to fix maximum hours for an employee, the Fair Labor Standards Act is not applicable to the employee, although the commission fails to exercise the power.

Questions and Answers

[Mr. Parker will be glad to answer questions regarding legal problems of PIT AND QUARRY readers. Questions should be addressed to Leo T. Parker, Legal Editor, PIT AND QUARRY.—ED.]

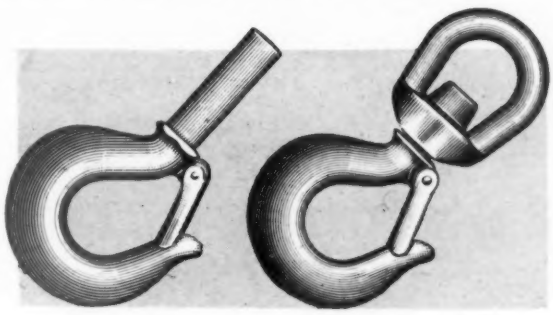
Legal Editor: Recently we had a suit filed against us by the owner of a dwelling on the ground that we can not operate our stone plant because it interferes with the owner of this dwelling. The point is he built his house after we were in operation. Does this effect or change our rights? —A. Corp.

Answer: There is no legal rule that one must *never* use his own property so as to do any injury to his neighbor or his proporty. Such a rule could not be enforced in civilized society. Persons living in organized communities must suffer some damage, annoyance, and inconvenience from each other: If one lives in the city he must expect to suffer the dirt, smoke, odors, noise, and confusion incident to city life.

While every person is bound to make a reasonable use of his property so as to occasion no *unnecessary* damage or annoyance to his neighbor, yet a reasonable use can not be defined by any certain general rules, but must depend upon the circumstances of each case. Modern courts will not grant injunctions against the operation of expensive and public-benefitting plants simply because the owner of adjoining property complains that their operation occasionally effects inconvenience, discomfort or inconsequential damages.

For example, in *Bentley v. Empire Portland Cement Company,* 96 N. Y. S. 831, it was shown that a cement plant had been built in a sparsely settled community at great expense and was using the most approved apparatus. Whenever the wind was

Some inexperienced worker got careless . . . you know those cases. But it couldn't have happened with a Laughlin Safety Hook. Its stout-springed latch is specially designed to trap the sling securely and hold it despite terrific stress and strain . . . no danger of jolting or jarring free.



These safety hooks are made of selected, heat-treated steel . . . galvanized or plain finish.

Laughlin offers you the most complete line of hoist hooks on the market in the most varied choice of foolproof safety designs. They give added protection in these days of faster schedules and fewer skilled workers.

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THE THOMAS LAUGHLIN Company
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in a certain direction, smoke and ashes were carried to a dwelling, about 1,000 feet away, covering everything within and without the house with a heavy dust, in consequence of which the rental value of the property was decreased. The property owner filed suit against the cement company and asked the court to grant an injunction against further operation of the plant. In refusing to grant the injunction the court stated:

"The manufacturer is not bound to consult the taste, pleasures, or preferences of others; but he is bound to respect his neighbors' rights. . . . Something must be conceded to the manufacturer. His business is legitimate. The public has an interest in his productions. . . . In this case the defendant does a large business. It has invested some $650,000 in its plant, and it employs some 70 or 80 men. Apparently it is using the most improved apparatus, is not guilty of any negligence, and an injunction, such as is asked for, would compel it to close its works. . . . Where the damage to one complaining of a nuisance will be large, in the case he be restrained, the courts will sometimes deny an injunction."

On the other hand, various courts have held that an injunction will be granted to prevent damage to adjacent property or discomfort to neighbors, if the instrumentalities which cause the injury may be remedied.

See the leading case of *Moon v. National Plaster Company,* 66 N. Y. S. 33, where a property owner sued a plaster company for an injunction to stop damages caused by dust and odors emitted from its plant. During the trial it was proved that the nuisance was not continuous but only occasional, resulting from defective equipment. The court granted a temporary injunction against the nuisance, saying:

"The case, therefore, seems to be one of a defective machine or machinery improperly used to the damage of another, and a resulting nuisance."

Therefore, this injunction simply prohibited the corporation from further operations until the defective equipment was repaired. Afterward it was privileged to operate the plant.

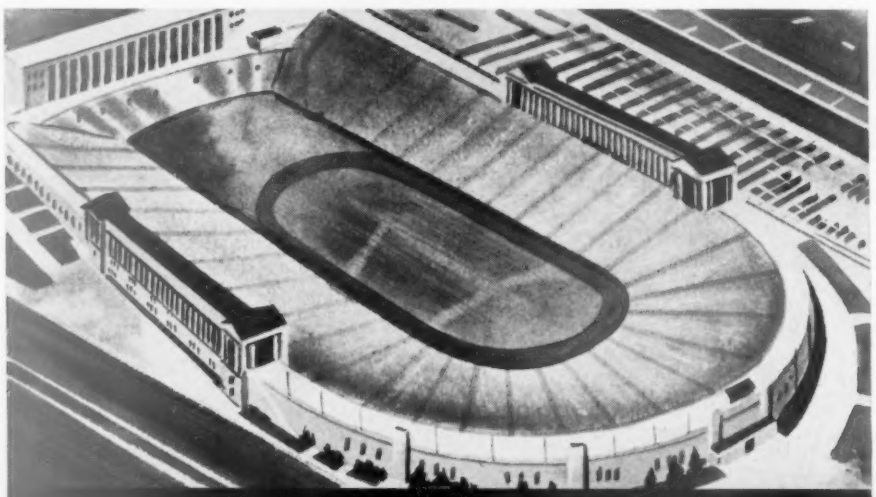
The fact that the owner built his residence after your plant was in operation is not important, if previously, there were other dwellings in this locality or district.

* * *

Legal Editor: When is operation of a quarry a legal nuisance that can be stopped by near-by property owners.—W. Q.

Answer: In Jones v. Kelley Company, 18 S. W. (2d) 356, it was disclosed that a rock quarry and crusher are located and operated within the corporate limits of a city. A property owner filed suit asking the court for a permanent injunction against its operations because it created considerable noise and dirt, and small rocks were hurled quite a distance. However, the court held that the owner may continue to operate the plant if the noise and dirt incident to the operation, and the danger of hurling rocks were *reduced* so as to safeguard the nearby property owners and their families. The higher court upheld the lower court's decision, thus merely restricting the operation of the quarry. This court explained important law, as follows:

"Operating a quarry and rock crusher may or may not be unlawful, depending upon the circumstances in each particular case. What might be a nuisance done in one place would not necessarily be a



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The great concrete amphitheaters, the famous "bowls" seating up to 125,000 spectators, are a spectacular example of the far-reaching influence upon American life of the Siamese Twin industries, cement and crushed stone. Most of the bulk and much of the quality of concrete depends upon crushed stone, and the two elements are inseparable.

Like its cement twin, the crushed stone industry steadily trends toward larger units, an improved and more highly specialized product and increasing application of dust collection equipment to facilitate continuous mass production.

Post-war demand for concrete will establish new records. Norblo engineers can help you now with your planning for post-war modernization. Present inquiries are welcomed by Norblo. You can get valuable help—ask for it.

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DUST COLLECTION SYSTEMS

THE NORTHERN BLOWER COMPANY

6409 BARBERTON AVENUE CLEVELAND 2, OHIO

nuisance done in a different place. The locality is to be considered in determining whether there is a nuisance, although it is not conclusive, but it is to be considered in connection with all the circumstances in the case. There are some nuisances in which the act complained of may be wrongful, but constitutes a nuisance only by reason of its location, and there may be an act or condition that is rightful, or even necessary, but may become a nuisance by reason of its location. What might be a nuisance in one locality might not be so in another. A business which might be perfectly proper in a business or manufacturing neighborhood, may be a nuisance when carried on in a residential district, and, conversely, a business which might well be considered a nuisance in a residential portion of a city or village may be proof against complaint when conducted in a business or manufacturing locality. . . . We think the lower court was therefore correct in permitting the appellees [owner of the quarry] to operate only on condition that they did not throw stones on the lands of others and did not do anything that injured or damaged the appellants or their families."

And, again, in *Melving v. A. L. Stone Company,* 94 Pac. 390, it was disclosed that a property owner filed suit against a quarry company and proved that the latter operated engines, near his dwelling, using oil fuel which emitted large quantities of greasy soot, dirt, and smoke. The property owner testified that the soot and smoke had damaged the house and furniture in the sum of $500. After carefully considering the evidence the lower court decided that the property had been damaged and, also, that large quantities of greasy soot, dirt, and smoke were frequently emitted from the engines operated by the company. Therefore, the court rendered a verdict in favor of the property owner for $307 damages, and at the same time granted an injunction against the company compelling it to operate its plant in the future so as to not further injure the adjoining property. The higher court sustained this verdict, saying:

"Where the nuisance operates to destroy health, or diminish the comfort of a dwelling the party injured is entitled to protection by injunction."

Therefore, it is quite apparent that the court may hold a company, which maintains a nuisance, liable in damages and at the same time prohibit further operation of the plant in a manner likely to continue the nuisance.

Portable pipe lines, composed of 20-foot sections easily handled by one man, followed our advancing forces across the desert. The wide range of Naylor Pipe sizes from 4" to 30" in diameter makes this pipe ideal for numerous post-war applications in the mining field.

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Hundreds of miles of portable pipe, quickly installed over the rough terrain, met the challenge of desert obstacles and these supply lines are credited by the Army with having helped win the victory.

The part played by Naylor Pipe in this dramatic undertaking again emphasizes the structural advantage offered by Naylor's exclusive Lockseam Spiralweld. For all its light weight, this distinctive pipe has long demonstrated its greater strength, flexibility, leaktightness and safety in many mining applications.

Just as it is serving our armed forces today, Naylor's portable, light-weight pipe with standard weight ends and standard pipe connections provides an unbeatable combination to fill your mining requirements.

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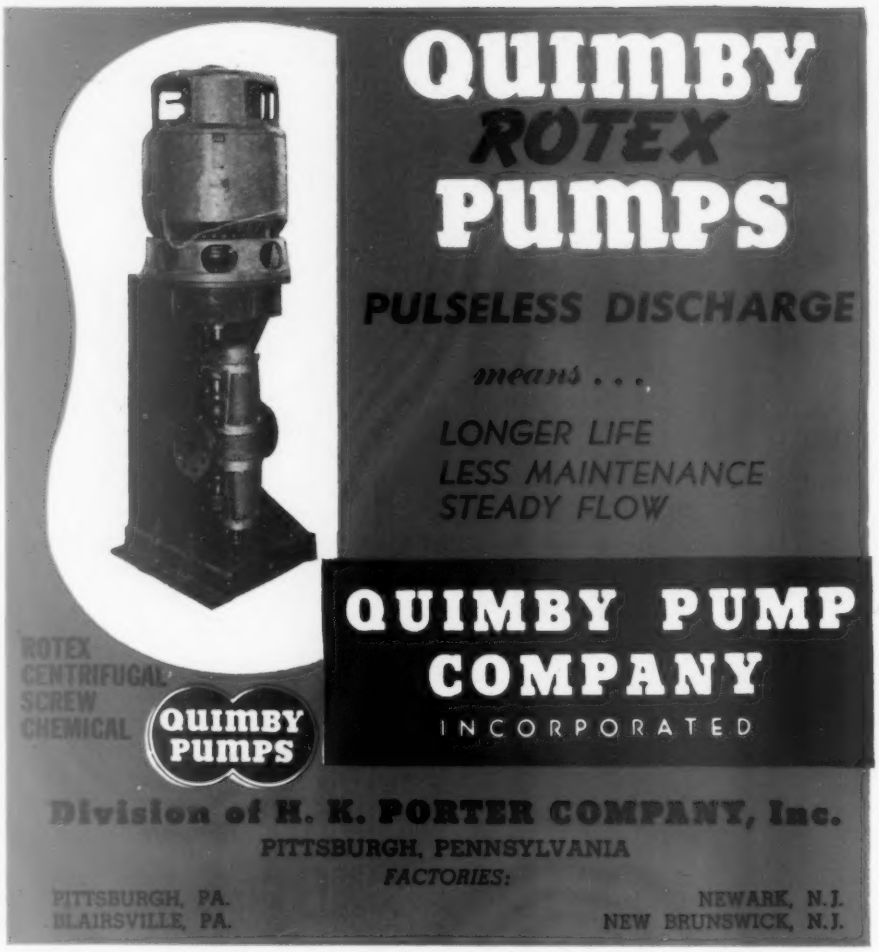

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Every "AMERICAN" is a designed-and-built three-striper for high capacity, long service life, and top operating economy.
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AMERICAN PULVERIZER CO., 1059 Macklind Ave., St. Louis 10, Mo

TRAFFIC News Digest

Central Freight Association

Docket 75043 (2)—Limestone, ground or pulverized, not burnt, c. l., min. wt. 60,000 pounds. Establish on, from Alton, Ill., to points in C.F.A. territory, rates as shown in Exhibit A below. Rates to apply only *via* routes over which merchandise percentages have been provided except additional routes may be included to the extent divisions are arranged.

EXHIBIT A

Proposed rates (in cents per net ton)
(Representative destinations)

Adrian, Mich.	303
Alliance, Ohio	369
Anderson, Ind.	248
Ashland, Ohio	336
Bad Axe, Michigan	380
Barberton, Ohio	347
Botkins, Ohio	281
Cambridge, Ohio	347
Canton, Ohio	358
Charlestown, Ind.	248
Chillicothe, Ohio	314
Coshocton, Ohio	347
Elwood, Ind.	237
Frankfort, Mich.	358
Greenville, Mich.	325
Huntington, Ind.	259
Lancaster, Ohio	325
Manistee, Mich.	347
Marion, Ind.	248
Massillon, Ohio	358
Menton, Ind.	259
Muskegon, Mich.	303
Ney, Ohio	303
Owosso, Mich.	336
Parkersville, W. Va.	358
Perkins, Ind.	204
Portland, Ind.	259
Portsmouth, Ohio	314
Sandy Lake, Pa.	391
Seymour, Ind.	237
Sharon, Pa.	380
Sturgis, Mich.	270
Urbana, Ohio	292
Wadsworth, Ohio	347
Wheeling, W. Va.	369
Wixom, Mich.	336
Zanesville, Ohio	325

Docket 75064 (1)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding, or silica) and gravel, in open-top cars only. Cancel present rates on, from Noblesville, Indiana, to various points in Indiana, published in N. Y. C. & St. L. Trf. 550-Q, account obsolete. Classification basis to apply in lieu thereof.

Docket 75116 (2)—Sand (except sand, molding, bonded (naturally or otherwise), and except ground or pulverized sand) in open-top equipment, c. l. (Any provisions of the aforesaid min. wt. which conflict

with the I. C. C. Service Order No. 68 are suspended). Establish on:

From New Galilee, Pa.
(Rates in cents per N. T.)

To	*Proposed*
Donora, Pa.	99
From Cannelton, Pa.	
Munhall (Kenny Yd.), Pa.	110
Bessemer, Pa.	110
South Duquesne, Pa.	121
Clairton, Pa.	121
Donora, Pa.	132
From Negley, Ohio	
Munhall (Kenny Yd.) Pa.	121
Bessemer, Pa.	121
South Duquesne, Pa.	121
Clairton, Pa.	121
Donora, Pa.	132

Subject to ExParte 148 increase (suspended).

Docket 75046 (1)—(a) Sand, molding, bonded (naturally or otherwise), in all kinds of equipment, c. l.; sand (except sand, molding, bonded (naturally or otherwise), and except ground or pulverized sand), in closed equipment, c. l.; (b) sand, except sand, molding, bonded (naturally or otherwise and except ground or pulverized sand) in open-top equipment, c. l. (see Note 1). Establish on, from points in the so-called Paines Group, viz.: Paines and Hemlock, Michigan. Proposed rates (in cents per net ton).

To	(b) Open Cars	(a) Closed Cars
Imlay City, Michigan.	105	132
Rochester, Michigan.	110	154

Rates are subject to Ex Parte 148 increases (suspended).

Note 1—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in closed cars to be assessed.

Docket 75147—Limestone, ground or pulverized, unburnt, c. l., min. wt. 60,000 pounds. Established on, from Marlo, Mosher and Ste. Genevieve, Missouri, to Henderson, Kentucky, $1.93 net ton, *via* Mo.-Ill. R. R., Nashville, Ill., L. & N. and *via* Mo.-Ill. R. R., Centralia, Ill., Sou.

Docket 75209 (2)—Lime, common, hydrated, quick, slaked or fibred, c. l. Establish on, from Niagara Falls, New York, to Martin, Ohio, 18c, min. wt. 30,000 pounds; 14c min. wt. 50,000 pounds, *via* N. Y. C. (E) Gardenville, N. Y., N. Y. C. (W) direct.

Docket 75212 (2)—Stone, crushed, slag or gravel, coated or impregnated with oil, tar or asphaltum (see note); asphaltum limestone (limestone having a natural apshaltum content of 2 per cent. but not more than 5½ per cent., broken,

Manganese Steel is "*At Its Best*" in Ball Mill Liners . . . . . .

Manganese steel has been used with outstanding economy for a generation in ball, rod and tube mills operated by mining and cement companies because of its stress-resisting toughness and its ability to withstand abrasive wear under brutal battering.

For crushing, grinding or pulverizing equipment of every type, manganese steel cannot be surpassed for coping with the terrific impact and abrasion that the wearing parts in such equipment must withstand; and, consequently, is usually the best value, regardless of lower pound prices sometimes available on less reliable metals. Here, as in so many other instances, a somewhat higher price (when it is higher) is more than offset by greater mill production, fewer shut-downs and lower maintenance charges.

Such parts as these, with their unsurpassed wearing life and resistance to breakage, are available to you in Amsco manganese steel, for ball mills, rod mills, tube mills, Kominuters—in fact, any type of heavy duty grinding equipment: breast plates; shell liners; end liners, feed and discharge; clamp bars; feed scoop lips or noses; Kominuter plates; grates and screen plates; gears and pinions; and manhole covers.

Be sure — specify Amsco manganese steel to the manufacturer of your mill when ordering replacement parts or new equipment.

Ask for Bulletin 1141-L on Ball Mill Liners and Bulletin 743-M on Manganese Steel in Mining and Quarrying Equipment.

S-16. 36 tons of manganese steel shell, manhole and end liners for 6'x8' and 5'x7' rod mills.

513-4. 112 outside and 50 inside end outlet grates for ball mills used in grinding gold ore, total weight 40 tons. They were machine ground on top surface to true them up, something unusual in ball mill grates.

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois

AMERICAN Brake Shoe COMPANY

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

crushed or ground), in open top equipment, min. wt. 90 per cent. of the marked weight capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply. To amend Item 9140 of CFA L Trf. 130-B. publishing rates on, from Belpre, Bloomville, Chillicothe, Cincinnati, Fort Jefferson, Hillsboro, Ironton, Kenton, Marion, Miamiville, Middlepoint, New Vienna, Portsmouth, Russell, Sandusky, South Lebanon, Toledo, Waterville, West Columbus and Youngstown, Ohio, to stations in Ohio, providing for the addition of "Wooster, Ohio" as a point of origin. Note: The oil, tar or asphaltum not to exceed 10 per cent. by weight of the commodity as shipped, the shipper to so certify on shipping order and bill of lading.

Docket 75230 (2)—Sand, (except sand, molding bonded) (naturally or otherwise) and (except ground or pulverized sand), in open-top equipment, carloads (see Note), minimum weight 90 per cent. of the marked capacity of the car, except when car is loaded to full visible or cubical capacity, actual weight will apply, provided that orders will not be accepted for cars of less marked capacity than 80,000 pounds, and provided further that when a shipper orders a car of this marked capacity or greater, and the carrier is unable to furnish car ordered and furnishes a car of greater capacity than ordered, the min. wt. for the car furnished, will be that which would have obtained had the car ordered been furnished and used. (Any provisions of the aforesaid min. wt. which conflict with the I.C.C. Service Order No. 68 are suspended). Note: Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in closed cars to be assessed. Establish on from Titusville, Pa., to Erie, Pa., 99c; Buffalo, N. Y., $1.21; Braddock, Pa., $1.32; Bessemer, Pa., $1.32; So. Duquesne, Pa., $1.32; Munhall (Kenny Yd.), Pa., $1.32 Clairton, Pa., $1.43; Donora, Pa., $1.43, and Steelton, Pa., $2.53 per net ton.

Docket 75243 (2)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), or gravel, c. l. Established rate of $1.60 per net ton on, from Kise, Ky., to Cincinnati, Ohio.

Docket 75244 (2)—Sand (except blast, core, engine, filter, fire or furnace, foundry glass, grinding or polishing, loam, molding or silica), or gravel, c. l. Established rates as shown in Exhibit A attached, from Kise, Ky., to various Virginia Ry. stations.

Docket 75245 (2)—Sand (except blast, core, engine, filter, fire or furnace, foundry, glass grinding or polishing, loam, molding or silica) or gravel, c. l. Established rates as shown in Exhibit B attached hereto from Kise, Ky., to various N. & W. Ry. stations.

Docket 75255 (2)—(a) Crushed stone or crushed stone screenings, in bulk, in open top cars, c. l. (b) Limestone, agricultural, unburnt (not ground or pulverized) in bulk, in open top cars, c. l. Establish rate of 99c per net ton on, from Holland, Ohio to Alvordton, Blakesley, Franklin and Kunkle, Ohio, based on short line miles applied to the scale in Ohio Docket 10400.

Illinois Freight Association

File 10209-M—Sand, c. l., as described in Item 10 of IFA Tariff 68-A, from Juda, Wis., to stations in Illinois and Iowa. To add Juda, Wisc., at Browntown, Wis., rates, to eliminate fourth section departure.

Southern Freight Association

Docket 30908 (carrier)—Topaz rock, ground or pulverized, c. l.,

REMEMBER THE MAINE..

POTATO CROP OF 1943

You can safely bet your family's ration books that Maine farmers will remember it with pride —and for many years to come! Fighting food . . . spuds by the millions of barrels! A Victory crop so enormous that unprecedented measures had to be taken to harvest it and keep it secure against Winter. And mister, *THAT'S WHERE GENERAL EXCAVATOR SHOVELS ENTERED THE PICTURE IN A BIG WAY.*

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SHOVELS
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Crawler & Wheel Mounted
THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

min. wt. 60,000 pounds. Establish from Staley, N. C., to Cincinnati, Ohio, 29c and to Louisville, Ky., 32c cwt.

Docket 30909 (shipper; suggested by carrier)—Establish rates on cement, c. l., for interstate and intrastate application to Holton, Tenn., from Burns, Tenn., 20c, Chattanooga,, Tenn., 16c, Cowan, 18c, Memphis, Tenn., 25c, Nashville, Tenn., 19c, Sherwood, Tenn., 18c, and from Memphis, Tenn., to Click, Tenn., 25c cwt.

Docket 32642 (1)—Silica sand, Portage, Wisconsin, to the Southwest. To establish same rates from Portage, Wisconsin, to the Southwest as are currently applicable from Browntown, Wisconsin, per Item 630-C of S. W. L. Tariff 162-R.

Docket 30933 (carrier)—Phosphate rock and phosphatic limestone, crude, c. l. Establish $4.34 net ton from Mt. Pleasant-Centreville, Tenn., District to Atlas, Mo.

Docket 30944 (shipper; suggested by carrier)—Ore, bauxite, crude, C. L. Establish $1.80 gross ton from Baton Rouge, La., to Mobile, Ala. Expires December 31, 1944.

Docket 30968 (carrier)—Eliminate the expiration date in connection with present rate of $2.82 per net ton on phosphate rock and phosphaltic limestone, c. l., from L. & N. R. R. and N. C. & St. L. Ry. stations in Mt. Pleasant-Centreville District to St. Louis, Mo., and E. St. Louis, Ill., and points taking same rates. Water competitive.

Southwestern Freight Bureau

Docket 32737 (1)—Lime, Sallisaw, Okla., to Dallas and Ft. Worth, Tex. To established rate of 12 cents per 100 pounds, minimum weight 80,000 pounds, on lime (calcium), viz.: Common lime, including magnesium lime, hydrated, quick or slaked, carloads, from Sallisaw, Okla., to Dallas and Ft. Worth, Tex.

Docket 32674 (1)—Lime, from and to Missouri and Arkansas. To cancel Items 1140 and 1150 of S. W. L. Tariff 45-Z, applying on lime, carloads, from Missouri and Arkansas points, to El Dorado and Junction City, Arkansas, account no movement.

Trunk Line Association

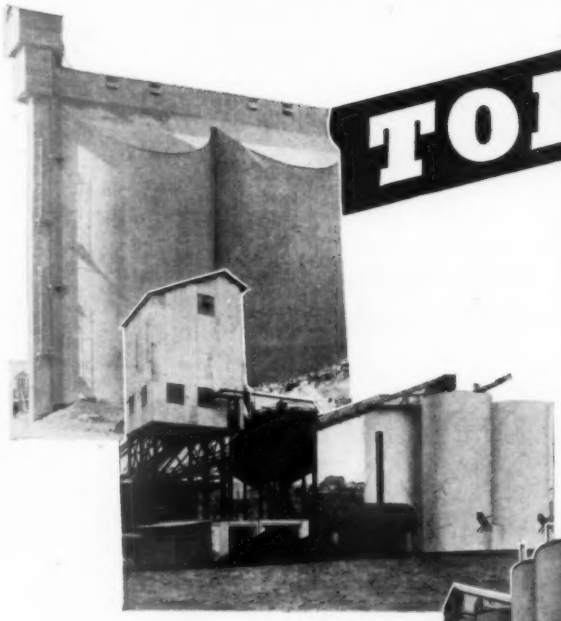
Docket 41970 (shippers)—Stone, viz.: crushed and screenings (will not include agricultural limestone or ground limestone, unburnt, fluxing stone or firestone; or stone coated with oil, tar or asphaltum), in straight or mixed carloads, minimum weight 90 per cent. of marked capacity of car, etc., from Monocacy, Pa., to Detroit, Mich., $4.84 per net ton, in lieu of present 6th class rate of 37 cents per 100 pounds. Reason: To reinstate rate formerly in effect.

Docket 41971 (shippers)—Sand (other than ground or pulverized or naturally bonded molding) and gravel, in open top cars, without tarpaulin or other protective covering, c. l., min. wt. 90 per cent. of marked capacity of car, etc., provided orders will not be accepted for cars of less marked capacity than 80,000 pounds from Barclay, W. Va., to Bute, Pa., $1.10 per net ton, in lieu of present class rate. Reason: Comparable with rates from and to other points.

M-4631 (shippers)—Limestone, crude, fluxing, foundry and furnace, c. l., min. wt. 90 per cent. of marked capacity of car, etc., from Bellefonte-Pleasant Gay, Howard, Pa., to Syracuse, N. Y., $2.46 per gross ton, in open top equipment, in lieu of present rate of $3.32 per gross ton. Also to cancel, account obsolescence, rate of $2.31 per net ton on the same commodity, from same origins, to Auburn, N. Y. Reason: Comparable with rates to other points in immediate vicinity.

PLAN TOMORROW'S CONSTRUCTION

TODAY



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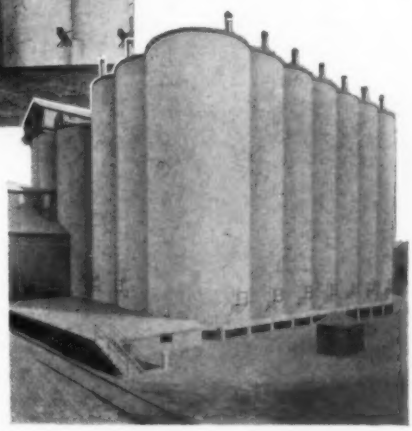

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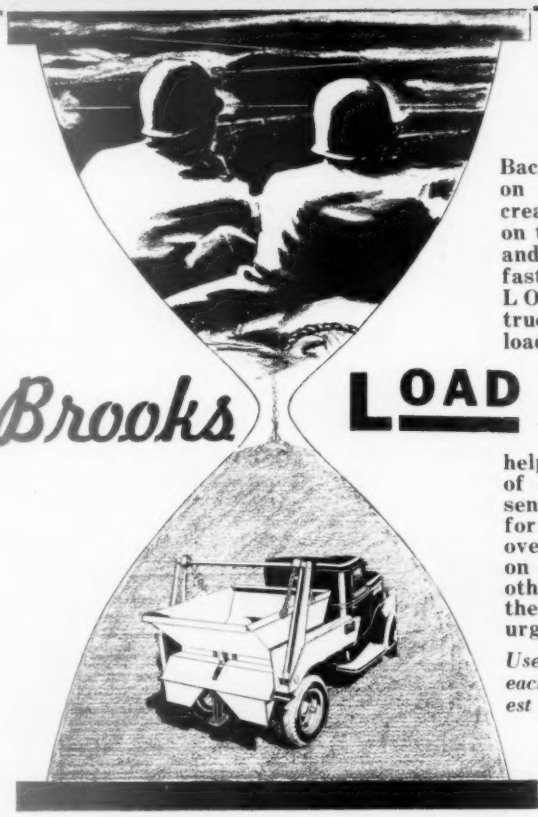

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E. C. MACHIN COMPANY
BUILDERS
Commonwealth Building—Allentown, Pa.

Docket 41992—(shippers)—Sand (except sand, molding bonded (naturally or otherwise) and except ground or pulverized sand), in open top equipment, C. L., (see note), min. wt. 90 per cent. of marked capacity of car, etc., from Titusville, Pa., to Erie, Pa., 99c. Buffalo, N. Y., $1.21; Braddock, Bessemer, So. Duquesne, Munhall (Kenny Yd.) Pa., $1.32; Clairton and Donora, Pa., $1.43 and Steelton, Pa., $2.53 per net ton.

Note: Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in closed cars are to be assessed.

Reason: Comparable with rates from and to other points.

Western Trunk Line Association

Docket E-41-598—Stone, crushed or ground, c. l., minimum weight 90 per cent. of marked capacity of car except when loaded to full visible capacity actual weight will apply but not less than 40,000 pounds, from Cannon, Mo., to points shown as taking Groups A (St. Paul) and B (Duluth) under Column 2 of WTL Territorial Directory No. 1-C. Agent Kipp's ICC A-3176 in connection with rates shown in Item 6715 of WTL Tariff 5-T. Present rates to Group A, 15c; Group B, 21c. Proposed rate to Group A, 21c; Group B, 15c (By shipper).

Docket E-41-600—Stone, crushed, ground or pulverized, carload min. wt. 90 per cent. of marked capacity of car but not less than 40,000 pounds, from Cannon, Mo., to destinations in Colorado and Nebraska shown in Items 5910 to 6030 of C. B. & Q. Tariff 5000-H, also Item 3660 of W. T. L. Tariff 18-Q. Proposed: Establish from Cannon, Mo., specific commodity rates based on same scale that was used from Hannibal, Mo. The Nebraska scale at that time was:

250 miles	9½c
275 miles	10 c
300 miles	10½c
325 miles	11 c
350 miles	11½c
375 miles	11½c
400 miles	12 c
425 miles	12½c
450 miles	13 c
475 miles	13½c
500 miles	14 c

(By shipper)

Docket E-41-601 — Limestone, crushed or ground, c. l., min. wt. same as provided in Item 500, C. B. & Q. Tariff 18870-C from Cannon, Mo., to distinations in Minnesota and South Dakota to which rates are now provided in C. B. & Q. Tariff 18870-C from Hanibal, Mo., White Bear, Mo., and Quincy, Ill. Pro-

posed: To establish specific commodity rates on the basis of the scale shown below, such rates to be predicated on mileages computed via short workable routes not tto exceed two lines, except where it is necessary to have three lines to make a complete route.

(Rates in cents per 100 pounds)

Miles	Rate	Miles	Rate
80	8½	325	13
90	8½	350	13
100	8½	375	14
115	9	400	14
130	9	450	15
145	9	500	17
160	9	550	18
175	10	600	19
200	10	650	20
225	11	700	21
250	11	750	22
275	12	800	23
300	12		

For distances over 800 miles extend scale on the basis of 1c. for each 50 miles. (By shipper)

Docket E-41-602 — Proposed: Amend Item 5500, Section A. W. T. L. Tariff 50-R to provide Cannon, Mo., as an origin point. (By shipper).

Docket E-41-604—Stone, crushed, ground or pulverized, C. L., min. wt. 90 per cent. of marked capacity of car but not less than 40,000 pounds, from Hannibal, White Bear, Mo., and Quincy, Ill., to Imperial, Neb. Proposed: $3.63 per net ton. (By shipper).

Phosphate Rock

No. 28960, Diamond Fertilizer Co. *et al. vs.* Aberdeen & Rockfish Railroad Co. *et al.*, embracing No. 28960, Sub. 1, American Agricultural Chemical Co. *vs.* Aberdeen & Rockfish Railroad Co. et al. By division 3. Rates on crude phosphate rock, ground and unground, in carloads, from producing points in Florida to certain destinations in Illinois, Indiana, Michigan and Ohio, found unreasonable. Reparation awarded and reasonable rates for the future prescribed. The Commission found that the rate assailed had been, were, and for the future would be unreasonable to the extent that they had exceeded, or might exceed, the following rates plus 3 per cent. for the period from March 17, 1942 to May 15, 1943: To Cincinnati, Ohio, $7.05; to East St. Louis, Ill., and Indianapolis $7.14 to Columbus, Ohio, $7.34; to Mariett, Ohio and Peru, Ind., $7.55; to Maumee, Sandusky, and Toledo, O., $7.64; to Hartsdale, Ind., $7.74; to Cleveland, Ohio, and Detroit, Michigan, $7.84; and to Alliance, Ohio, and Lansing, Michigan, $7.94, subject to a minimum weight of 100,000 pounds, except where car was loaded to its full visible capacity and the actual weight was less than 100,000 pounds, the minimum to be marked capacity of the car. The Commission further found that E. Raugh & Sons Fertilizer Co. and Smith Agricultural Chemical Co. complainants in No. 28960, and the complainant in No. 28960 Sub. 1, were entitled to reparation with interest. Chairman Patterson noted a dissent. The Commission required establishment of rates that did not exceed those aforementioned on or before May 4, on not less than 30 days' notice.

Ground Barite

No. 28926, Thompson, Weinman & Co. Inc., *vs.* Alabama Great Southern Railroad Company *et al.*, embracing No. 28935, Point Barite Company *vs.* Atchison, Topeka & Santa Fe Railway Co. *et al.* By division 2. Rates on ground barite (barytes), in carloads, from Cartersville, Ga., and Mineral Point, Mo., to points in Louisiana, Oklahoma and Texas, found unreasonable and unduly prejudicial. Lawful basis of

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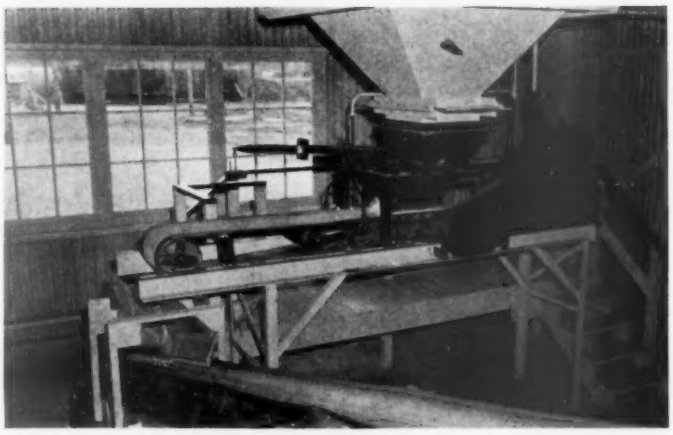


The above photograph shows one of several poidometers weighing and feeding dolomite to rotary kilns at Ludington, Mich, plant of Dow Magnesium Co.
Many poidometers are also being used for feeding stone, soda ash, coke, sinter, bauxite, and other material into grinding mills.
Space does not permit a thorough explanation of the many cost saving qualities of Schaffer Poidometers.
Install Schaffer Poidometers and watch results.

Send for Catalogue No. Five

SCHAFFER POIDOMETER CO.
2828 Smallman Street Pittsburgh (22), Pa.

BROWNHOIST BUCKETS

The greedy jaws of Brownhoist clamshell buckets speed up material handling in dirt, clay, coal, gravel and ore. Their deep, clean bites practically eliminate hand shoveling. Extra sturdy. Large sheaves reduce rope wear to a minimum. AVAILABLE IN ROPE-REEVE, POWER-WHEEL AND LINK-TYPE. For facts and prices write to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York City, Philadelphia, Pittsburgh, Cleveland and Chicago.

rates prescribed. The report said the complaints were directed primarily to the relation of the present column rates to first class published on their product from Cartersville and Mineral Point as compared with the rates in effect on ground barite, in carloads, from alleged preferred points. Complainants had requested the establishment of rates based on the same relation to first class as the rates in effect from Malvern, Ark., a competitive point, said the report, on the ground that the ground barytes shipped from Cartersville and Mineral Point and the ground barite ore shipped from Malvern were identical commodities. The Commission said that in Ground Barite Ore from Arkansas to La. and Tex. Ports. 251 I.C.C. 487, the Commission had concluded that ground barite and ground barite ore were both crude barium sulphate; that both were used in the southwest for manufacturing drilling mud; and that, from the transportation standpoint, it was impractical to base rates on percentages of purity of the same commodity. The report found that the assailed rates on ground barytes from Cartersville, and on ground barite (barytes) from Mineral Point, in carloads, to points in Louisiana, Oklahoma and Texas, were, and for the future, would be, unreasonable to the extent that they exceeded or might exceed rates made 14 per cent. of the zone 111 first-class rates prescribed in the twenty-first supplement report in the southwestern revision including general increases subsequently authorized, carload minimum 80,000 pounds. It also found the assailed rates unduly prejudicial to complainants and preferential of their competitors at Malvern, Butterfield and Hot Spring, Ark., to the extent that the rates from Cartersville and Mineral Point bore or might bear a higher percentage relation to such first-class rates than the rates that were or might be concurrently maintained on like traffic from the origins in Arkansas to the same points in the states named, or bore or might bear to the corresponding first-class rates from the Arkansas origins. The establishment of the basis found reasonable would remove the undue prejudice found to exist, it said, and that no order as to undue prejudice was necessary.

Car Surplus Report

U. S. railroads reported an average daily surplus of 20,486 freight cars for the week ended January 22, according to the car service division of the Association of American Railroads.

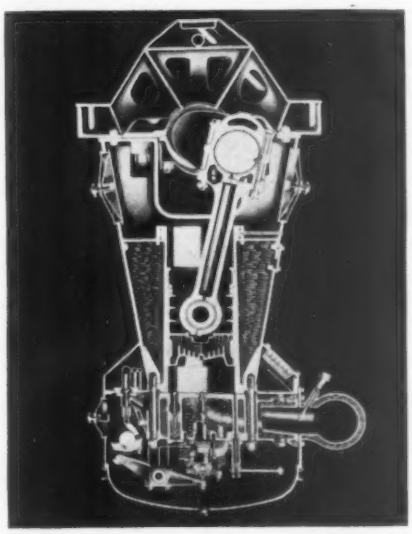
NEW MACHINERY and SUPPLIES

● Diesel Engine

The new Series 50 Diesel engines, recently introduced by the Joshua Hendy Iron Works, incorporate into one model a wide range of modern design features that contribute to dependability in heavy-duty stationary and marine services.

Hendy Diesels are 4-cycle, with a bore of 12 inches and stroke of 15 inches, and are normally rated at 833 horsepower per cylinder at 500 r.p.m.

The design of the new Diesels reflects years of research and development by Hendy power-plant engineers, who combine long experience on other prime movers produced by this company with similar experience in stationary and marine Diesel fields. Precision workmanship and tremendous plant facilities, such as required for volume production of turbines and large reduction gears, were available for the manufacture of Hendy Diesels.



Cross-section of the Series 50 Diesel.

For the first time in heavy-duty Diesel construction, a number of modern features are incorporated in the cylinder-head assembly. Unit-type fuel pumps and injectors combine with overhead camshaft to reduce the number of working parts. The valve and rocker-arm design insures valve seating without side thrust on the valve stems, and reduces valve adjustments in service.

Unit fuel injectors in each cylinder eliminate the need for long, high-pressure fuel lines between the injection pump and the nozzle. Higher pressures which improve atomization are thus possible. The entire pump and nozzle unit can be quickly and easily removed for cleaning, if necessary.

Efficiency is further advanced by the use of dual alloy-steel intake and exhaust valves. Smaller valve diameters and closer volumetric control are achieved with the dual valves. Valves operate at lower temperatures, which increases their service life and saves grinding. The large valve area reduces velocity through the openings and further reduces valve maintenance. The valves operate in removable guides.

Heads are cast from Meehanite with large water passages for cooling of valve guides, injector, and valves. Dead-water spaces are eliminated by jet action which directs cooling water to points of highest potential temperature.

● Welding Rod

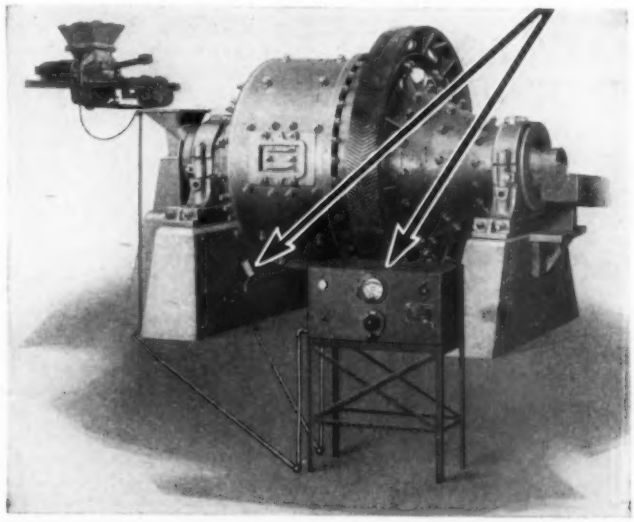
The Mir-O-Col Alloy Company, Los Angeles, manufacturer of hard-surfacing welding rod and ferro-alloy castings, announces the addition of "Ni-Resist" rod to its line.

These rods are available in sizes from ⅛ to ⅝ inches in diameter and coated for both acetylene and electric application. Ni-Resist is not a hard-surfacing rod but is a corrosive-resistant alloy and its use is recommended where this quality is desirable.

The company also recently published a "Weldor's Guide," copies of which may be obtained by addressing the company. This 28-page booklet explains the application technique of hard-surfacing material by welding in an understandable manner.

● Screen

The Iowa Manufacturing Company, of Cedar Rapids, Iowa, now has on the market a horizontal vibrating screen for stationary and portable gravel plants, trade-marked with the "Cedarapids" name and consistent in design and con-



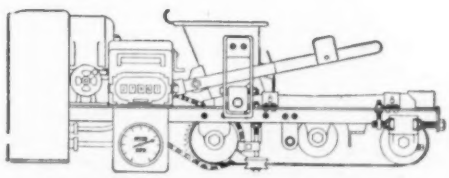
FEED BY WEIGHT AND SOUND

An ideal combination to boost mill tonnage.

The "Electric Ear"* sound control unit maintains maximum capacity by holding the mill at peak output without manipulation.

The Weight Recording Feeder controlled by the "Electric Ear" indicates the feed rate and totalizes the weight fed.

Bulletins 42 and 43.



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COMPANY, INCORPORATED, YORK, PENNA.

NEW YORK CHICAGO SAN FRANCISCO TORONTO

IT COSTS NO MORE TO USE THE BEST

REPLACE WITH
"Indian Brand"
MANGANESE STEEL
LONG LIFE
ABRASION
RESISTING PARTS
FOR
QUARRY, ROAD,
DREDGING,
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The Frog, Switch & Mfg. Co. CARLISLE, PA.
ESTABLISHED 1881

BUILDERS
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CONVEYOR SCALE

Dependable equipment for *accurately* weighing and/or blending gravel, cement, crushed rock, limestone or sand, *in transit*, on conveyor belts. Write to Builders-Providence, Inc. (Division of Builders Iron Foundry), 9 Codding St., Providence 1, R. I. for Bulletin 322.

Sincerely Yours
BUILDERS-PROVIDENCE

Full-floating horizontally-mounted screen.

struction with the other equipment bearing that name.

The company features this screen as the first full-floating screen with no transmission of vibrations to the subframe and with directional vibration forces that cannot become unbalanced. The motor driven by a V-belt drive and replaceable by a countershaft, if desired, is mounted to one side of the frame on a detachable platform.

A number of advantages are claimed for the screen. When installed on a portable plant, it gives complete access to either roll or jaw crusher by simply removing crusher hopper. Its use on a portable plant reduces to a minimum the weight added by such an installation, an important item to all portable-plant buyers. It operates flat, moving the material by the action of the screen rather than by gravity, and thus affording more accurate control over the screening. Its construction allows the piling on of material without injury to the screen cloth, which means faster yield per hour, or in other words, more capacity. Furthermore, several elements of convenience, such as the ease and simplicity of installing a new section of screen cloth or rearranging the combination of sizes, and the fact that this type of screen saves headroom, an obvious advantage both in working and in transporting, enter into the situation in favor of the new screen. They are available in a variety of sizes, single, double, or triple deck, ranging from 2 by 4 feet to 4 by 14 feet.

● Clutch

The Amalgamated Engineering & Research Corporation, Chicago, announces a new type of automatically engaging and self-disengaging centrifugal clutch. This new clutch can serve either as a coupling between shafts or as a driving pulley or gear in a transmission, as well as a starting cushion between power units and driven mechanisms.

This new unit which is known as the "Torkontrol" consists of a partially-filled oil chamber fitted with a freely rotating hub, which carries a series of movable wedge-shaped flyweights. As the hub revolves these weights fly outwardly and engage the internal rims of the outer case binding the hub and shell into a functionally solid pulley or coupling.

This unit works equally well in either direction (hence is reversible) and is "set" to engage or release at a given speed, and to slip in case of overload.

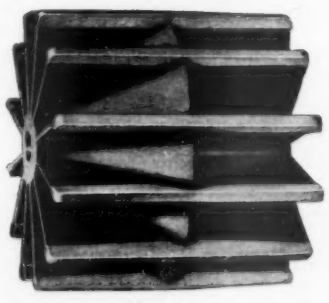
The manufacturer claims that this unit permits the use of smaller engines or motors which start without load, give smooth cushioned application of power, straight line acceleration with resulting saving in operating cost.

"Torkontrol" clutches have been built in all sizes from ¼ to 500 horsepower for both built-in and general application.

● Compressor

The Sullivan industrial air compressor, Class WG-9 is particularly applicable for present-day requirements. This unit, a product of the Sullivan Company, Michi-

WANT TO SAVE TWO-THIRDS?



Monarch Wing Type Tail Pulley.

"BELT SAVER"

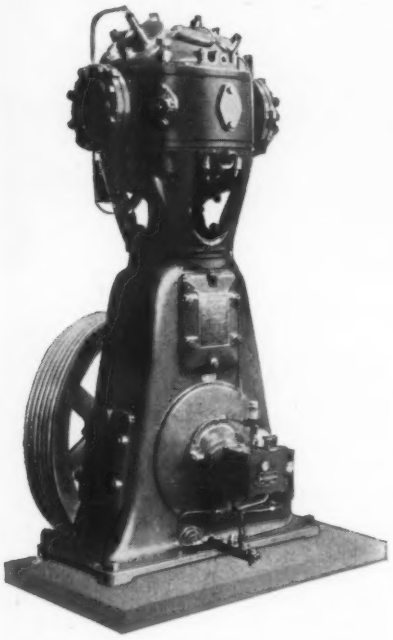
The exclusive *wing and cone* of this pulley permits the lateral escape of materials ordinarily entrapped between the belt and the face of the pulley; it reduces the belt surface exposed to abrasive action by two-thirds, yet in no way does it impair the operating efficiency of the elevator. It also gives exceptional service with many materials which have been "hard to handle" with the conventional tail pulley.

Manufactured in standard sizes, and when ordering, follow usual specifications.

SPROUT, WALDRON & COMPANY
136-137 Sherman St.
Muncy, Pa.

gan City, Indiana, is designed for heavy-duty, continuous 24-hour per day service in smaller industries or for specialized needs in larger plants.

It is a single-stage, double-acting, water-cooled vertical unit with exceptional capacity per square foot of floor area. Large smooth air passages throughout the unit assure unrestricted air flow from intake



Single-stage vertical-type compressor.

to discharge. Truncated piston design gives large valve and head radiation area and valve assemblies are easily accessible for inspection.

Valve cage ports and cylinder assemblies have liberal water jacketing for high cooling efficiency. Because of its smooth running characteristics and the small floor area required, the WG-9 needs only a simple block-type foundation which can be quickly, easily and cheaply installed in any unused space. Automatic stop and start control can be furnished.

● Transformer

A new design of General Electric's line of indoor dry-type transformers for primary circuits 601 to 15,000 volts provides greater safety and ease of installation than previous dry-type designs, as well as giving them an outward appearance of the latest model room-type air conditioning units. A radical departure from the screened enclosure which has characterized some of the dry-type units in the past, the new design employs sheet steel with flowing lines, smoothly rounded corners, and a two-tone gray finish.

According to the company's transformer engineers who designed the case, weight of the material used for the new enclosing case is less than that for the old screened enclosure. In addition, the new case provides improved and directed circulation of the cooling air.

The new case is highly functional, being designed especially for indoor installations in industrial plants. Horizontally louvered sections on two sides of the case can be removed easily, making the interior accessible for cleaning and tap changing. The taps are brought to a convenient terminal board located just below the edge of the casing and close to a diagrammatic nameplate. The deeply pitched louvers provide an outlet for the cooling air. Air is taken in at the bottom of the case through a screened opening along the bottom of each side, and is circulated through and around the coils by convection.

All live parts are metal-inclosed, various portions of the case being separately removable. The high-voltage terminal compartment cover can be removed to facilitate connecting the transformer to the supply circuit. Similarly, access to the low-voltage terminals is gained by removing the low-voltage compartment cover. The solid side plate on each side of the transformer can be taken off to clean or inspect the core and coils. A removable top section at each end of the case facilitates drilling and installation when overhead conduit connections are desired. Holes are provided so that rods

Streamlined case for 3-phase dry-type transformer.

Something NEW in Gas Engines

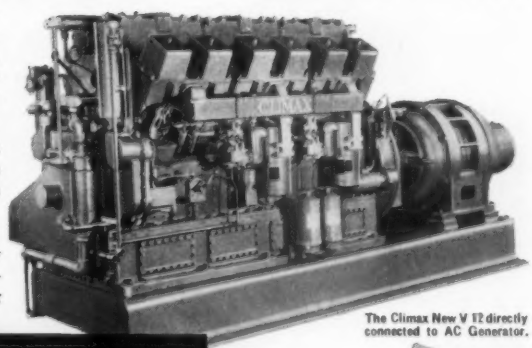
FOR STATIONARY OR PORTABLE

Gravel Plant and Quarry

EQUIPMENT . . . ELECTRIC POWER

The Climax V 12 is a new heavy duty engine expressly built for industrial service — for compressors, pumps, blowers, mill drives. With an AC or DC generator it produces low cost electricity up to 312 KVA.

This compact power plant provides that smooth flow of abundant power possible only from a 12 cylinder negine. It starts as easily as an automobile engine and run on natural gas, butane, gasoline or othe fuels. The V 12 is simply designed, easy to operate. No specially trained mechanics are needed for maintenance or repairs.



The Climax New V 12 directly connected to AC Generator.

Climax
ENGINEERING COMPANY
GENERAL OFFICES AND FACTORY: CLINTON, IOWA
REGIONAL OFFICES: CHICAGO, ILL., DALLAS, TEXAS

Bulletin Available

Send for Bulletin S 329 containing specifications, performance curves, drawings, dimensions and complete description.

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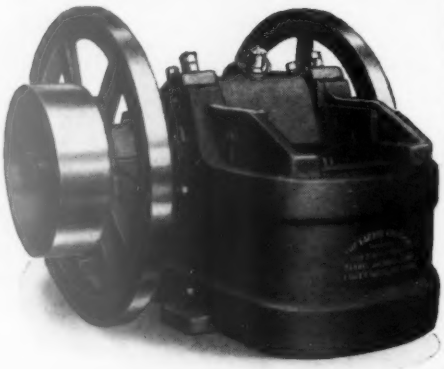
CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service.



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have proved good design pays—oil-bath enclosed clutches and gears, Haiss feeding propellers, manganese steel parts, power and stamina. Lowest cost per yard.

3, 5 or 8 yd. capacities...Write for bulletins.

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HAISS
142nd St. & Rider Ave., New York 51, N.Y.
PORTABLE BELT CONVEYORS • CLAMSHELL BUCKETS

Portable highway batching plant.

may be inserted through interior supports for easy handling. If crane facilities are not available, jack bosses on each of the four lower corners facilitate moving the unit.

The solid sheet-metal top and sides and the deeply pitched louvers protect the unit from hazards which might result with open-screen enclosures, such as sprinkler system operation or the accidental contact of rods or wire being carried by workmen.

Length of the transformers is about twice the width so that they can be installed in dead spaces between pillars of a building or in out-of-the-way corners on a factory floor. For mounting on platforms above the floor, this design usually makes possible the use of a narrow and a simple supporting structure.

● Batching Plant

Long hauls of mixed concrete by the mixing equipment are eliminated by a complete highway portable batching plant, being built by the C. S. Johnson Company, Champaign, Illinois. This unit, according to the manufacturer, can be towed behind a truck to the most advantageous point in the pouring area, and is quickly set up for operation.

All materials are delivered to the batching unit in bulk-material trucks. Among the advantages claimed for this unit, which is called the Johnson Porto-Batcher, are (1) elimination of considerable handling equipment, (2) reduction of the number of mixing units per concrete yard miles.

A unique feature of the Porto-Batcher is the charging skip. By providing proper intermingling of aggregate with cement when discharged into the mixer, this charging skip provides pre-mixing and pre-shrinkage which the manufacturer reports compares favorably with the best results of the best fixed batching plants. This feature, it is said, prevents cement from touching wet mixer opening and walls, thus eliminating gumming and excessive wear.

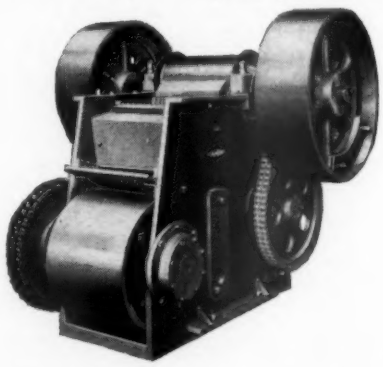
This charging skip has a capacity of 43 cubic feet . . . 33 cubic feet for aggregate and 10 cubic feet for cement. The aggregate from the three storage compartments reaches the skip through three fill valves. The cement and each size aggregate is weighed on a separate weight beam. The cement compartment is completely sealed to avoid contact of the cement with wet aggregate.

The Johnson Porto-Batcher is easily towed behind a truck on its own pneumatic tired wheels. One man control of all batching operations by the ingenious grouping of all levers in one central location. The batching cycle is 90 seconds.

● Crusher

The Diamond Iron Works Inc., Minneapolis, manufacturer of jaw and roll crushers and both portable and stationary crushing plants, recently introduced the Diamond Dual-Action crusher. This machine is said to combine the functions of the jaw and roll crushers in one machine, giving primary and secondary crushing in a single operation.

Many advantages become immediately apparent to the quarryman and contractor. First, is a material saving in weight. Instead of a jaw weighing perhaps five



The combination jaw and roll crusher.

and a half tons and a roll weighing perhaps six tons, the Dual-Action crusher—combining the performance of the two—will weigh about six tons. The machine occupies about the same space as a large jaw crusher. It is said to use about half the horsepower consumed by the average jaw and roll. And, in actual use, it is reported to have out-produced any combination of jaw and roll of comparative size without plugging, and without flats or slivers.

The new crusher is particularly suited for use in portable crushing and screening plants. In addition to the savings in weight, space and horsepower, the crusher allows the plant to be considerably shorter, lower, lighter in weight, and less costly. Diamond Iron Works Inc. will gladly send equipment bulletin D-44-M upon request. Its dealers are located in all important centers.

Trade Literature

The pieces of literature listed below can be obtained direct from the manufacturers named, or requests can be addressed to Pit and Quarry's "Service to Readers" Department.

HEAVY-DUTY, LIGHTWEIGHT FOLDING LADDERS. 4 pages. Duo-Safety Ladder Corporation, Oshkosh, Wisconsin.

INDUSTRIAL HANDLING EQUIPMENT. 6 pages. Rose Manufacturing Company, Detroit.

TEXROPE MAGIC-GRIP SHEAVES. 4 pages. Allis-Chalmers Manufacturing Company, Milwaukee.

HOW TO SELECT AND SPECIFY INDUSTRIAL WIRE CLOTH, 8 pages (Bulletin 602). BUFF-ALOY ABRASIVE RESISTANT WIRE CLOTH FOR STONE, SAND, GRAVEL AND ABRASIVE INDUSTRIES (Bulletin 601). Buffalo Wire Works Company, Buffalo.

CALCULATING CHAIN DRIVE CENTERS AND CHAIN LENGTHS. 20 pages (Bulletin 1991). Link-Belt Company, Chicago.

SCHRAMM MODEL 20 COMPRESSOR (Bulletin 4320). Schramm, Inc., West Chester, Pennsylvania.

LARGE SYNCHRONOUS MOTORS. 4 pages (Bulletin 173). Electric Machinery Manufacturing Company, Minneapolis.

FRACTIONAL HORSEPOWER TEXROPE V-BELT DRIVES. 44 pages (Bulletin B6249). Allis-Chalmers Manufacturing Company, Milwaukee.

RECENT PATENTS

Grinding mill. Walter G. Clark, Los Angeles, assignor to Clarkiron, Inc., same place. No. 2,327,402.

Concrete mixer. Harold A. and Gustave H. Wagner, Portland, Oregon. No. 2,327,473.

Concrete-mixer tower. Harold A. Wagner, Portland, Oregon. No. 2,327,-477.

Rock Drill. Joseph H. Brown and John F. Jagiel, Chicago. No. 2,327,619.

Slakable lime in pebble form and method of producing it. Charles L. Montgomery, West Rutland, Vermont, and Richard D. Cheesman, Allentown, Pennsylvania; said Montgomery assignor to Vermont Marble Company, Proctor, Vermont, and said Cheesman assignor to Traylor Engineering & Mfg. Co., Allentown, Pennsylvania. No. 2,328,573.

Excavator. Edward A. Drott, Milwaukee, assignor to Hi-Way Service Corporation, same place. No. 2,328,715.

Rock Drill. Otto J. Schorer, Northampton, Massachusetts, assignor to Worthington Pump & Machinery Corporation. No. 2,328,926.

Pulverizing and classifying machine. Henry G. Lykken, Minneapolis. No. 2,-329,208.

Excavator. Ernest S. Berney, Fallon, Nevada. No. 2,329,241.

Dewatering screen. Robert J. S. Carter, Minneapolis. No. 2,329,333.

Record Tonnages in Screening Rock, Gravel & Ores Throughout the World

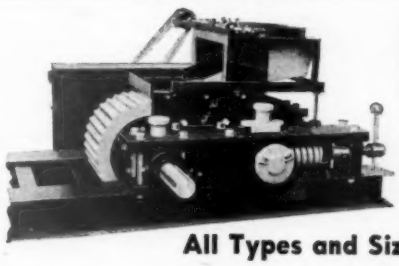
TY-ROCK

SCREEN

Full Floating Circle-Throw Action for Coarse and Medium Sizes

Write for Catalog No. 65

THE W. S. TYLER COMPANY CLEVELAND, OHIO



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Roll Crushers — Revolving Screens
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Jaw Crushers — Elevators
Conveyors, etc.

All Types and Sizes to Suit the Job

Write for bulletins.

Also Rebuilt Equipment

NEW HOLLAND MACHINE CO.
NEW HOLLAND, PENNSYLVANIA

PERFORATED METAL SCREENS
FOR SAND, GRAVEL STONE, ETC.

Manufactured exactly to your specifications.

Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
Prompt Shipment

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ERIE THE COMPLETE LINE BUCKETS

Hundreds of Erie Buckets are being shipped monthly for war uses. Straight line bucket production experience means better buckets for post-war and fast delivery. Investigate the complete Erie line now.

ERIE STEEL CONSTRUCTION CO · ERIE, PA.
AggreMeters · Buckets · Concrete Plants · Traveling Cranes

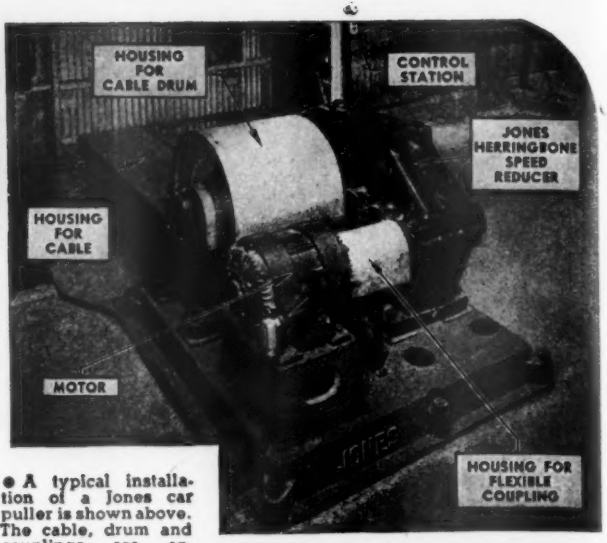
For spotting your cars- JONES CAR PULLERS

YOU will be surprised how much time can be saved in the spotting and switching of cars by using a Jones car puller. These sturdy, compact units will speed up car handling to the point where they soon pay for themselves in the saving of time and labor.

These car pullers are built by Jones as complete units with motor included if desired, or with base to take standard motor, as supplied by the purchaser. The cable drum is driven by a Jones triple reduction Herringbone speed reducer and the control station may be located at a point to give the operator a clear view of the tracks and spotting positions.

Even in plants where comparatively few cars are handled it has been found that a Jones car puller more than pays its way. Prices and complete information will enable you to judge whether such an outfit might pay out in your plant. Write for complete information.

W. A. JONES FOUNDRY & MACHINE CO.
4441 W. Roosevelt Road, Chicago, Illinois



● A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.

● A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.

Jones HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS
CUT AND MOLDED TOOTH GEARS • V BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • PULLEYS
FRICTION CLUTCHES • TRANSMISSION APPLIANCES

WELLMAN WILLIAMS TYPE BUCKETS

Williams Buckets have been famous for their many fine mechanical details for nearly 40 years. Since 1931, Williams Buckets have been built by Wellman.

WELDED CONSTRUCTION, featured in Wellman custom-built buckets, which made them so predominant in heavy duty steel mill service, is now applied to all

Wellman-Williams Buckets
FOR LONGER SERVICE WITH LESS MAINTENANCE COST

Built in Multiple Rope, Power Arm, and Power Wheel Types in 3/8 yd. to 16 1/2 yd. capacities.

Send for Free Bulletin Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

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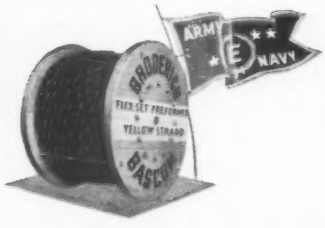

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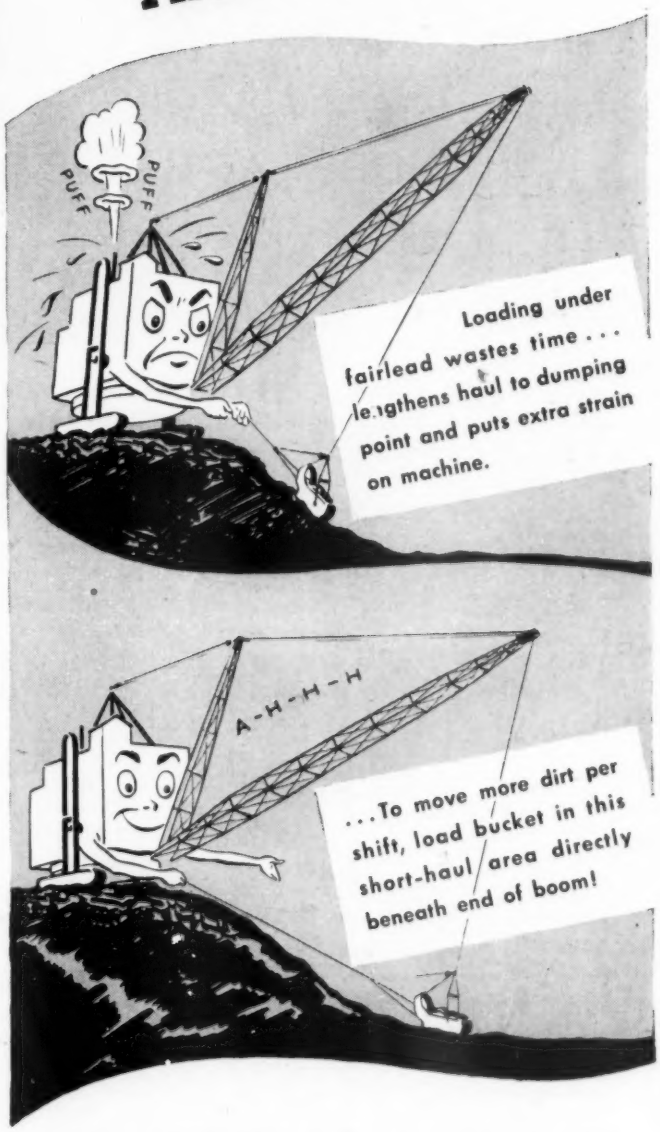
DRAGLINE PRODUCTION TIP NO. 1

DON'T LOAD THE BUCKET UNDER THE FAIRLEAD!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PUFF
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A-H-H-H
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Get bigger payloads in wet digging with a Hendrix Lightweight. The perforations let the water run through, and provide a capacity load each trip. Their round design eliminates breaks which occur regularly in buckets perforated with square holes or made with lattice pattern.

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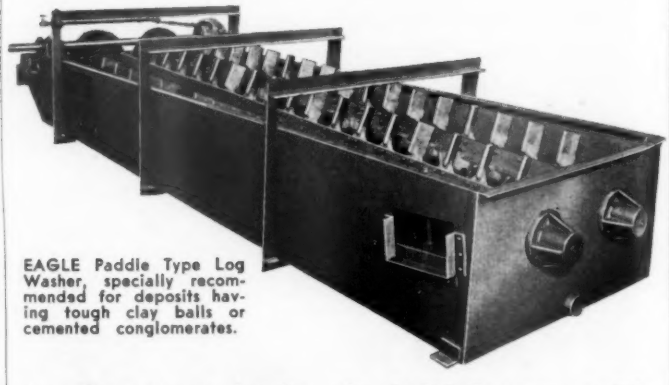

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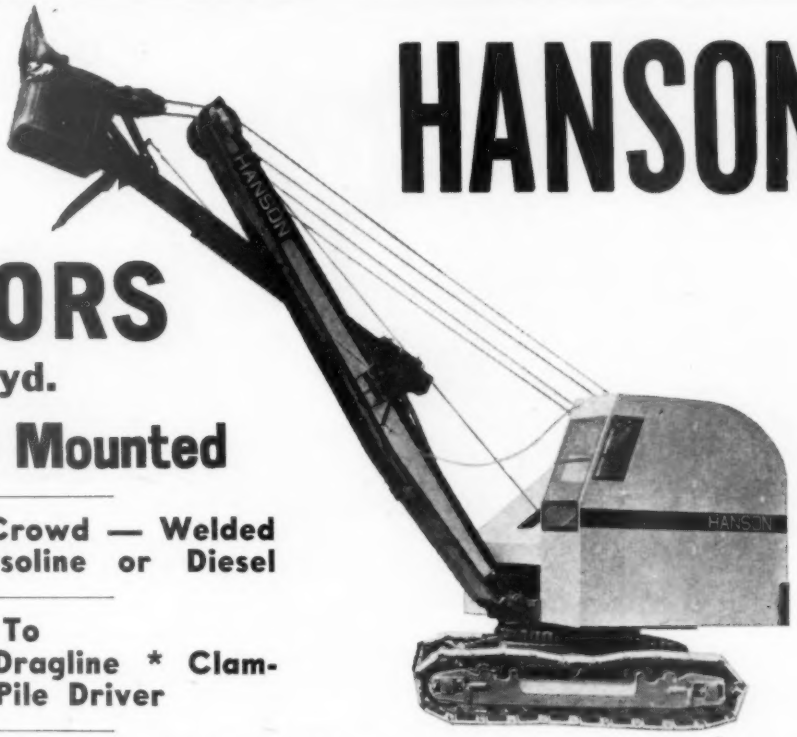

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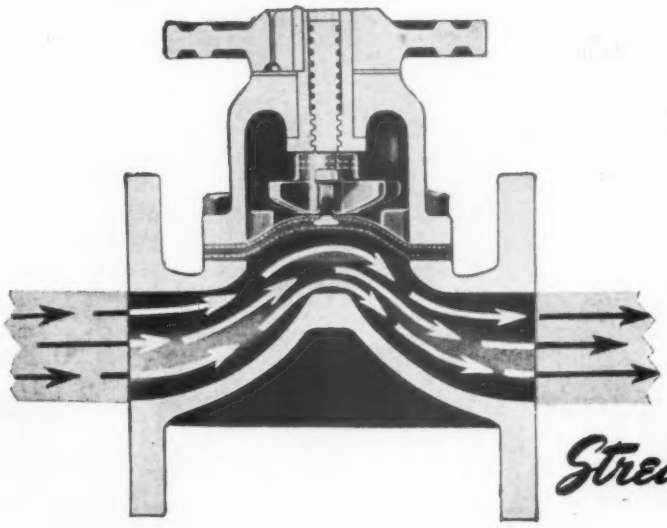

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MARCH, 1944

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This machine has a rotary table with four mold boxes so arranged that while a pallet is being placed in one mold, another is being filled, another is being hydraulically pressed, while the fourth is being ejected. Vibration and pressure are combined in making the block. Features which have contributed to 35 years of successful J & C brick presses are being incorporated in this new unit. But it's the many new features that make the new J & C unit newsworthy.

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The CONCRETE MANUFACTURER

MARCH, 1944

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY - MIXED CONCRETE

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RAY L. SMITH, JR.
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Concrete-Pipe Association to Broaden Scope of Activities

THE thirty-seventh annual convention of the American Concrete Pipe Association took place at the Drake Hotel, Chicago, on February 9 and 10. A record attendance of 137 members and guests participated in a well-rounded program of business and technical sessions devoted to problems of the industry.

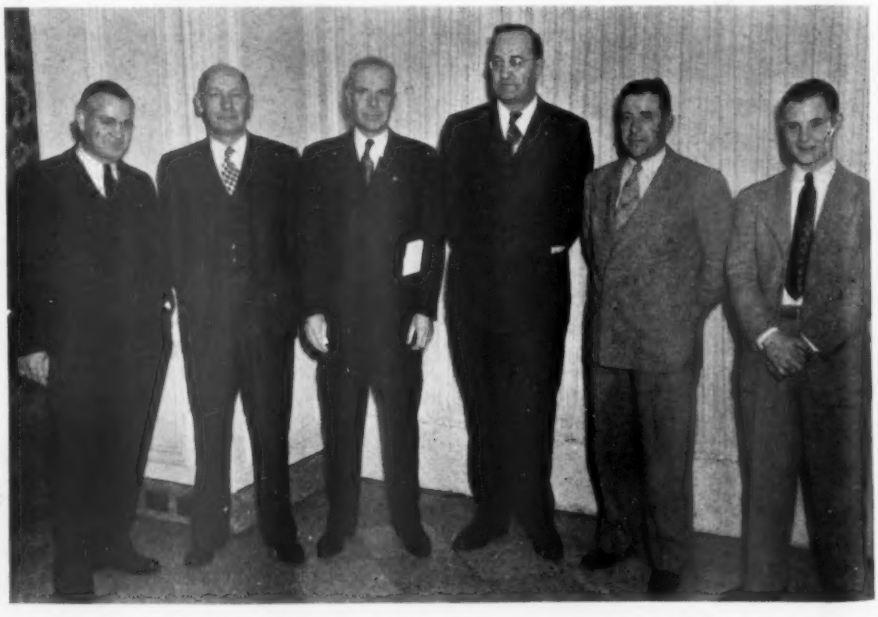
President W. E. Corbett opened the first session on February 9 with a cordial welcome to the members present. Discussing briefly some of the current problems confronting producers of concrete pipe, Mr. Corbett stressed the importance of making plans now for the post-war activities of the industry. Great pressure, he said, will be exerted to continue war-time control of industry in the post-war period unless American business men gird themselves now for the struggle.

M. W. Loving, secretary-treasurer of the association, presented his annual report at the conclusion of Mr. Corbett's address. Sketching briefly the history of the concrete-pipe industry from its humble beginnings, Mr. Loving disclosed that in the peak year of 1942 production of concrete pipe soared to over 4,000,000 tons.

While describing in some detail the scope and nature of the consulting services rendered by him to members of the association, Mr. Loving took the opportunity to issue a strong warning against the use of sewer or culvert pipe for pressure service. In this connection he revealed that the possibility of using reinforced-concrete pipe for the Big Inch pipe line had been submitted to the association. After careful study of the service conditions and the high working pressures involved, the association expressed the opinion that concrete pipe was in no way suitable for the job. A recommendation such as this, Mr. Loving concluded, is made in the interests of the long-range welfare of the concrete-pipe industry.

The report of T. J. Kauer, assistant secretary and Washington representative, brought out the fact that under the controlled-materials plan concrete pipe is now a class "B" ma-

(*Continued on page* 140)



Concrete-pipe makers from the far west at the convention included, left to right: H. B. Tellyer, Tellyer Concrete Pipe Co., Albuquerque; H. A. Weigand, California Concrete Products Co., San Jose; H. W. Chutter, Jourdan Concrete Pipe Company, Fresno; Elmer L. Johnson, Concrete Products Co., Colton, Cal.; Fred N. Linn, United Concrete Pipe Co., Temple City, Cal.; Pardner Tellyer.

Development of Farm Market Receives Spotlight at Concrete-Masonry Meeting

another ON THE SPOT report

MORE than 500 concrete-products manufacturers and other interested individuals were registered for the second war-time conference of the National Concrete Masonry Association, held, as was the first such meeting a year ago, in the Hotel Sherman, Chicago. While those in attendance heard rather gloomy predictions for the construction industry as a whole in the immediate future, they were impressed with the assurance that their products would fare rather better than those which are not so readily available while a nation continues to fight a large-scale war. The farm market is to be cultivated intensively in the immediate future, all indicators pointing to an outlet for large quantities of concrete block among this large portion of the country's population.

The association elected Fred W. Reinhold of Anchor Concrete Products, Inc., Buffalo, as its 1944 president, succeeding Walter Manhardt, Best Block Company, Milwaukee, who becomes chairman of the board. Dean R. Lynde, Harold L. Spaight, and Ray Berger were chosen vice-presidents and Clarence Ehle continues in office as secretary-treasurer.

President Walter J. Manhardt opened the business session of the convention on Tuesday afternoon, February 15. Hailing the first anniversary of the association as an independent organization, Mr. Manhardt paid tribute to the excellent co-operattion of other officers and directors. Good volumes and stable markets are in prospect for 1944, he asserted, and the industry's post-war outlook is encouragingly bright. He warned, however, that there would be new products and materials to compete with at the conclusion of the war.

In his annual report Executive-Secretary E. W. Dienhart traced the history of the movement to establish an independent organization, and he disclosed that at the present time the association has 179 members and 10 associates. Mr. Dienhart said that the association was organized for the benefit of both small- and large-volume producers, pointing out that almost half of the 1,700 plants reporting in a recent survey showed productions of less than 50,000 units per year. The association needs these smaller producers, he said, and welcomes them to membership.

Continuing, Mr. Dienhart discussed several of the projects undertaken by the association in its first year, citing particularly a case in Boston in which a bricklayers' union sought legislation to prohibit the local use of concrete products. Quick and effective action by the association in this instance headed off a move that might have involved far-reaching consequences for the entire industry.

In discussing the association's plans for 1944 Mr. Dienhart stressed the importance of developing the farm market, and pledged that the activities of the association would be extended as widely as possible in the interest of the entire industry.

Construction Prospects OPENING the first general session of the convention in the afternoon, Carl F. Clausen, Chief Non-Metallic Minerals Section, Building Materials Division of the War Production Board, presented an outline of construction prospects for 1944. While the construction picture for 1944 is generally bleak, Mr. Clausen predicted that concrete masonry will fare much better than many other building industries. He stated that in 1943 the use of concrete masonry units conserved between four and five million board feet of critical lumber, and that this performance record definitely establishes concrete block as a building material in its own right.

Mr. Clausen disclosed that preliminary surveys indicate a 33 per cent. drop in 1944 production of masonry units compared with 39 per cent. in other building industries and 46 per cent. in cement. There is a possibility that concrete masonry may soon carry a priority rating.

Russell G. Creviston, General Chairman of the Producers' Council Postwar Committee, spoke next on the platform for post-war construction. Developed over a period of two years by key executives from almost a hundred different industries, the platform covers all phases of the post-war construction problem from employment and technical developments to marketing and finance.

Mr. Creviston thinks it is of major importance that the construction industry in the future recognize the public's vital interest in its activities.

The entire program of the Producers' Council, Mr. Creviston continued, is closely interrelated with the problems of general industry and commerce and represents the broadest study of post-war problems so far undertaken. Producers of concrete masonry were particularly interested in Mr. Creviston's announcement of the proposed establishment of three or more regional research committees for the purpose of testing materials in combination.

W. D. M. Allan, Director of Promotion, Portland Cement Association, continued the discussion of post-war planning. Charging that the construction industry, although the second largest in the nation, failed to make its influence felt sufficiently, Mr. Allan asserted that the industry will have itself to blame if the post-war construction potential fails to materialize. Developing this theme, he pointed out that planning to-day is largely confined to the federal and state levels, which normally account for only 25 per cent. of total construction.

Mr. Allan presented figures obtained in a survey of a mid-western town to demonstrate the kind of planning he believes must be done in every community if there is to be full employment after the war. The mere listing of jobs, he warned, is not planning, nor is it reasonable to suppose that public works construction alone can carry more than a small part of the employment load.

Modular Planning FREDERICK HEATH, JR., chairman of the Producers' Council sub-committee on modular products, opened the discussion of modular planning. A careful and logical approach to the problem of reducing waste in building construction, modular planning would accomplish this by introducing dimensional co-ordination in building products. Mr. Heath particularly called attention to the fact that there was no thought or intention of standardizing building designs, and that it would be necessary to sell the plan to architects before it could possibly win general acceptance.

M. W. Adams, secretary of the

Modular Service Association, continued the discussion. The only wide application of dimensional co-ordination, he stated, has been in Germany, where modular planning has been in effect since 1929. Almost all Germany's war industries and plants were built in conformity with modular planning, and the saving in time alone is believed to have been well over 50 per cent.

Mr. Adams showed a number of slides demonstrating the applications of modular planning. Concrete block, he said, lends itself to dimensional co-ordination more readily than most building materials.

At the close of the meeting a social session was held in the Crystal Room of the Hotel Sherman.

G. S. Hayde, American Aggregates Co., Kansas City; Irving Fricke, Wm. Fricke Sons Co., Manitowoc; W. C. Smith, Cooksville Co., Ltd., Toronto; R. Stanley, American Aggregates Co., Kansas City.

Waylite At the Waylite group meeting on Wednesday morning, February 16, the following divisional committee was chosen to represent these producers within the association: Henry E. Buchholz, chairman (Chicago Insulcrete Company, Franklin Park, Illinois), Paul E. Bohm (Concrete Products Corporation, South Bend, Indiana); and E. M. Prettyman (Grays Ferry Brick Company, Philadelphia).

Presiding at the meeting was Harold L. Spaight (Cedar Rapids Block Company, Cedar Rapids, Iowa). He reported that his company has had considerable success with waterproofing Waylite blocks by adding calcium steatite to the mixture in the proportion of 1 pound per sack of cement. While the additional cost is about 1½ cents per unit, the ability of the blocks to resist the passage of moisture usually makes its use justified.

Several Waylite users are now employing air-entraining cement and most of them were high in their praise of this recent development. "Green" units are able to withstand handling much better and corners do not fall off so readily with the air-entrained mixture, they reported.

Mr. Buchholz told of his success in selling the farm market in northern Illinois. He described a circular promoting concrete-masonry hog houses which his company had printed and mailed to 10,000 farmers within 50 miles of Franklin Park. To date, said Mr. Buchholz, over 100 sales of hog houses have already been made as a direct result of the mailing and orders are still coming in. The entire cost of printing and mailing was about $400.

Paul Woodworth, who recently joined the Waylite Company after many years with the Portland Cement Association, also spoke, as did other members of the Waylite organization. Mr. Woodworth urged that Waylite-block makers broaden the scope of their operations by manufacturing flue blocks and 4-inch partition tile. The high thermal efficiency of the material in the case of flue blocks and the sound-absorbing properties in the case of the partition units make Waylite the ideal material for these specialties, he pointed out.

Haydite The separate meeting for producers using Haydite aggregates proved to be so interesting that it was continued on the following day. It was presided over by Walter J. Manhardt (Best Block Company, Milwaukee), who saw that the discussions had no chance to lag. Prominent in these discussions was W. Chester Smith (Cooksville Company, Ltd., Toronto), who said that the curing of concrete products is a cement rather than an aggregate problem and suggested that the cement companies supply information to the operators on this subject. He briefly described his company's extensive operations and said that curing has been one of their major problems as they make a wide variety of products which range up to joists 40 feet long and concrete of 6,000-pound strength. In describing his experience with war-plant construction he said that wood and sheet metal had been used on temporary plants built only to last the duration of the war until he was able to prove that plants could be built more cheaply by using concrete products throughout except for the steel framework. The lower fire-insurance, heating and maintenance costs of the concrete buildings were the determining factors. He also stressed the importance of employing salesmen who understand their customers' problems and are competent to advise them. Many other producers contributed to the discussion by telling of their experiences with Haydite products and of the many types of products they have added to their lines in recent years.

Celocrete One of the divisional meetings was devoted to the problems of concrete-unit manufacturers who use Celocrete as their aggregate. Jay C. Ehle, who presided at the meeting, told of the methods used by his company in Cleveland. His company uses coarse and fine aggregate in the proportion of 80 and 20 per cent. respectively, mixes the ingredients for 5 minutes in a 46-cubic foot mixer and makes its blocks with a Stearns Joltcrete machine. The initial aggregate contains about 12 per cent. of moisture, which is retained by storing the aggregate under cover after receipt in open motor trucks which have traveled about a mile from the source of supply. After the blocks are made they are subjected to curing with low-pressure live steam at a temperature of about 200 degrees F. in 90-

foot kilns fitted with tight-fitting canvas doors. This temperature has been found to be the optimum with respect to breakage which is practically nil, but was found very high when the temperature was only 120 degrees. A 100-horsepower boiler supplies the heat for 7 kilns by bringing first one kiln up to the required temperature, then another, then a third, after which time the steam delivered to the first one can be reduced and sent to the fourth kiln. About 4 or 5 hours is required to bring a kiln to the 200-degree temperature. When using high-early-strength cement a strength of 950 p.s.i. is attained after 36 hours.

Another manufacturer uses coarse and fine aggregate in a 60-40 ratio and obtains blocks with a texture as rough as that of cinder blocks.

One block maker said that he had obtained maximum strength out of 15-minute mixing, longer mixing producing a wet mix that is almost unmanageable.

Another manufacturer reported the use of 110-degree F. steam with a fog spray and the attainment of 1,200-p.s.i. strength using sand and gravel as aggregate. One manufacturer said that he had found that the use of 125-pound steam at 350 degrees F. increases the strength 20 per cent. with sand and gravel as compared with the use of lower pressure and lower temperatures.

With reference to curing costs Mr. Ehle said that the curing of 350,000 blocks per month requires 50 tons of coal, handling 2,476 blocks per kiln, and using the 200-degree temperature he had mentioned. He said, too, that dry aggregate requires the use of more cement as the voids fill with cement instead of water.

One producer who uses oil-burning salamanders at the ends of 80-foot kilns obtains 1,200-pound strength after 7 days, using an 80-20 aggregate ratio, temperatures between 110 and 120 degrees F., overnight curing being followed by storage outdoors.

There was also some discussion of the cracking of blocks around windows in finished structures. This was held by some of those present to be due to shrinkage. One manufacturer favored the thinning of the center partition in 3-core blocks and the provision of thicker facing shells above and below the mortar joints only, because, in his experience, this change in design prevents cracking. He said, too, that the use of flexible mastic in open joints will have the same effect.

Another speaker pointed out that the use of ¼-inch pencil rods as reinforcing will prevent cracking around windows. In his experience the cracking usually occurs within two months after erection of the structure. In the New York housing projects horizontal reinforcing under the windows is used to avoid cracking, said another.

H. C. Lutes, Layrite Concrete Products Co., Spokane; Stephen Flam, Sherman Oaks, Cal.; G. F. Steigerwalt, Haydite Concrete Products Co., San Rafael, Cal.

One manufacturer pointed out the fact that if the mortar is stronger than the block, the cracking will occur in the latter. Another block maker, who uses river sand and pea gravel as aggregates and regular cement, recommended the use of a 1-4½ mortar mix. He added that the use of 2 sacks of high-early-strength cement and 1 sack of mortar cement gives a pasty mix and strengths up to 1,200 p.s.i.

Heavy Weight Benjamin Wilk presided over the divisional meeting for producers using heavyweight aggregates. Austin Crabbs of Davenport, Iowa, opened the discussion with the suggestion that studies be made to determine if a 5-per cent. specification limit on water absorption would be generally acceptable. Mr. Crabbs stated that his own experience indicated that water absorption can readily be kept under 5 per cent., and he went on to cite several instances in which low-absorption blocks were definitely preferred by purchasers. He pointed out that the wet appearance of masonry walls having over 5 per cent. absorption creates an unfavorable impression and does incalculable harm to the industry in general.

A general discussion of the problem ensued, in the course of which it was suggested that manufacturers develop simple methods for making absorption tests in their own plants with a view to collecting information on the subject for future reference.

Air-entraining cement came in for a brief discussion. It was brought out that the material was originally developed to prevent scaling and cracking of pavements due to the action of chlorides used to remove ice, and that very little is known at present about its suitability for other uses. The statement was made that strength is reduced from 10 to 20 per cent. by the use of Vinsol resin cement.

The meeting elected I. J. Westerveld of Wausau, Wisconsin, Fred Kettening of Seattle, Washington, and Earnest Swanson of Kansas City, Missouri, to represent the heavy-weight producers for the coming year. This committee will study the specification change proposed by Mr. Crabbs.

Farm Markets At a luncheon meeting on Wednesday, February 16, W. G. Kaiser of the Portland Cement Association spoke on the "Food Fights for Victory" campaign. Asserting that concrete products have not so far played their proper role in the farm field, Mr. Kaiser disclosed that the War Production Board now recognizes the essentiality of farm work.

The program of the War Food Administration, he stated, will require greatly accelerated farm construction and maintenance work, but producers of concrete products must go after this market. It is essential, Mr. Kaiser concluded, that farmers know what products are available.

Following Mr. Kaiser's talk a new motion picture illustrating farm uses for concrete-masonry units was shown.

B. G. Lange, Precast Concrete Products Co., Chicago; "Doc" Vander Heyden and Ray Minette, Cities Fuel & Supply Co., Milwaukee, with patented floor- and roof-block for precast slabs.

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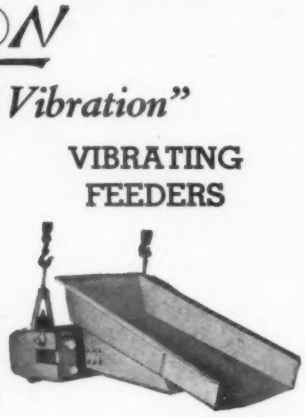

with adjustable power, on those "Constipated" bins and hoppers to keep their contents agitated and free-flowing.

7 models — ranging from 4 lbs. to 500 lbs. in weight.

Under those bins and hoppers to regulate their discharge by rheostat control of flow.

Capacities of from ounces to TONS per hour.

ALSO—*"Weigh-Flow" Weigh Feeders*

for accurate control in the continuous feeding of bulk materials at a constant weight.

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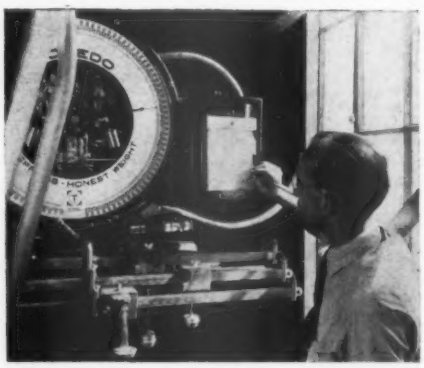
SYNTRON CO., 385 Carson St., Homer City, Pa.

[SC]² PRECISION CONCRETE CONTROL

Definitely improves concrete quality and reduces its cost. Now used in many progressive ready-mixed plants.

[SC]² CONTROL saves - - - -
YIELD. Most of the ordinary variation. You can set your mixes to a yield tolerance of ¼% and collect for some of the concrete that you now give away.
CEMENT. Most of the cement that has to be added to provide for the usual variation in the water-cement ratio. Substantial savings are often possible.
TRUCK TIME. Eliminates hold-ups to add water. Saves by fast accurate batching.
STOCK PILING. No longer necessary for moisture control.
[SC]² CONTROL always improves competitive position and increases business.
[SC]² CONTROL uses TOLEDO, the world's most accurate scales, and TOLEDO SERVICE to keep them accurate.

The [SC]² Moisture Meter. The only unit capable of determining moisture content in less than one minute.



The [SC]² Compensator which compensates for the moisture content in every ingredient and graphically records its every operation.

Write for information. Let us show what [SC]² CONTROL can do in your plant.

SCIENTIFIC CONCRETE SERVICE CORPORATION
McLachlen Building, Washington, D. C.

Motor-Truck Outlook Following the luncheon the afternoon session opened with a talk by Harry L. Gormley, regional director, Motor Transport Division, Office of Defense Transportation, Chicago. He warned his listeners that truck tires were becoming critically scarce and asked full co-operation of everyone against the overloading of trucks and other abusive practices which shorten tire life. He also predicted a real gasoline shortage for commercial users late this year. Repair parts, he said, are becoming more plentiful, although the increasing demand is more than keeping pace with the supply as trucks become older and require more mechanical attention.

Plant Design The Detroit area has always been a leader in large-scale production of high-grade concrete-masonry units and in the development of outstanding production methods. Its local organization, the Detroit Concrete Products Association, recently made an intensive study of plant design to guide those of its members who have new plants in prospect in the postwar era. In these studies that organization has had the benefit of ideas contributed by the equipment makers and leading producers in other areas. The basic plant, developed as a result of these studies, was described by the following members of the Detroit group which took over the remainder of the session: Benjamin Wilk (Standard Building Products Company); Roy McCandless (Cinder Block, Inc.); Ray Berger (Martin Berger Cement Block Company); and D. J. Warsaw (Hay-Con Tile Company).

I. J. Westerveld, Wausau Concrete Co., Wausau, Wis.; C. E. Swanson, Concrete Building Units Co., Kansas City; and F. M. Kettenring, Graystone Concrete Products Co., Seattle, were elected members of the divisional committee on heavyweight units.

This plant was designed for a

single production machine with a capacity of 4,000 to 5,000 units per 8-hour day. It was felt that a machine of this size, even for small producers offered a better investment even though used only part of the time, than one or more smaller machines.

Selection of a suitable site must take into consideration the accessibility of railway and highway routes and the availability of public utilities, it was pointed out. A hill-side location is recognized as the ideal since it enables direct loading of the storage bins, eliminating the rehandling of materials. But, because such sites are seldom available, consideration of this design was not undertaken.

Both overhead bins and skip-loading from ground level have seemed equally popular but the bin method was favored, provided care is exercised to see that the location of the supporting legs does not hamper the movements of workmen on the production floor. A 150-cubic yard aggregates bin, partitioned to store as many different materials as needed, was felt to be of ideal size since it will store enough aggregates to serve more than a day's production requirements. Mr. Wilk decried the all-too-common practice of using a single size aggregate, declaring that for proper gradation, fine and coarse sand and pea gravel are necessary in the proper proportions. Sometimes it is even advisable that a third sand be available to temper the mix, he said.

Bulk cement was favored since it costs about 5 cents per barrel less and results in an ultimate saving of 10 cents more when the cost of unloading sacked cement and other factors are taken into account. According to Mr. Warsaw, it takes 5 men about 2 hours to unload and pile 140 barrels of sacked cement. The use of bulk cement will pay for the added cost of the equipment needed for its storage and handling in about six years, in the Detroiters' opinion, and show a profit after that. A 2-compartment, 50-cubic yard cement bin was recommended, the screw-conveyor serving the batcher to be equipped for 2-speed operation, delivering 90 per cent. of the batch at high speed and dribbling in the remainder at low cost for accurate measurement at the cut-off. Air jets in the bin were suggested to improve the flowability of the cement and to prevent arching within the bin.

Inclosed chain-bucket elevators were preferred for handling the cement and an inclined belt-conveyor was favored for loading the aggregate bins with a swivel spout controlled from the ground for diverting the various sizes into the proper compartments.

Batching by weight in a traveling weigh larry over a 50-cubic foot batch-type mixer was recommended, the mixing cycle being planned for 10 minutes, although it was realized that a 6-minute cycle would probably be needed for top capacity. Mr. Berger discussed the use of continuous-type mixers, and, while he uses them in his own plant with satisfactory results, is of the opinion that further development is needed to increase their efficiency before they are widely adopted.

The hopper over the molding machine should be of sufficient size to hold 1½ batches of concrete which, with the batch in the mixer, would provide 2½ batches ahead of the production machine, insuring against delay in molding for lack of material.

Power-driven fork-lift trucks were favored for transporting the racks into the curing rooms and from the curing rooms into the yard. Curing rooms should be 13 feet wide to accommodate two rows of racks with 6 inches clearance. Low-pressure steam with a maximum temperature of 200 degrees F. was urged for curing to make it possible sufficiently to cure the units in 24 hours to meet strength tests.

The plant structure should be designed to include sufficient office space, shower and locker rooms, compressor room, machine shop and boiler room with provision for future expansion. All the equipment must be of sufficient size to insure against bottlenecks in production. The ideal height from production floor to mixer was fixed at 14 feet.

In discussing some of the phases of the production cycle as outlined by the Detroit men, the use of a power-driven sack cleaner was strongly urged upon those who purchase cement in cloth bags. Tests have proved that, even after vigorous hand shaking after emptying, the beaters in these power-driven devices often extract as much as ½ pound of cement from an empty sack!

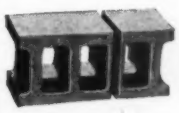
In connection with mixer operation, manufacturers were urged to check the blade settings regularly, about ½-inch clearance being the recommended setting. Cleaning and oiling the inside of the mixer, it was agreed, is good practice since it prevents the accumulation of concrete which lowers the efficiency of the machine to a marked degree.

FASTER CUTTING
...with
Clipper Masonry Saws

Your Special Size and Shape Brick or Concrete Block can now be "Tailor Made" at a moment's notice!

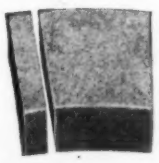
The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

Here are a few typical examples of the speed and accuracy with which concrete products and fire brick can be cut.



This concrete block, converted into a special size, was cut completely in two in 19 seconds.

One of the many intricate cuts performed on first quality clay brick for heat treating furnaces —made in 8 sec.



Rotary Kiln Blocks, cut to size for "key" bricks in rotary kilns, require only 10 sec. for completion of cut.

Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnisite brick was cut in 12 seconds!

Clipper Saws are available for trial. Write for Descriptive Catalogs.

THE Clipper MANUFACTURING COMPANY
"CUTS RIGHT THRU"

4029 MANCHESTER
ST. LOUIS, MISSOURI

Building Codes The final session was opened on Thursday morning by Paul M. Woodworth, who discussed the American Standards' Association's new building code for concrete masonry. Sponsored by the National Bureau of Standards, and developed with the full coöperation of all competing interests, the new code permittes greater latitude in the use of a wide variety of sizes, shapes and bonds than has heretofore been sanctioned.

Mr. Woodworth urged manufacturers to promote acceptance of the code by local building officials in the interests of a wider use and application of concrete-masonry units.

Floor Systems Clarence F. Moore, engineer for the cement-products unit of the Portland Cement Association, spoke next on concrete-floor systems. Asserting that an unparalleled opportunity had been created by the lumber shortage, Mr. Moore deplored the industry's failure to develop a floor system using standard concrete units adaptable to all types of construction. He pointed out that tile and concrete-joist construction is widely used, although masonry units, particularly in the lightweight classification, have a number of inherent advantages.

Mr. Moore showed a number of slides illustrating the use of masonry units in floor construction. He disclosed that the Portland Cement Association is preparing a series of tables for use in this field of application, and will also shortly introduce a design incorporating an accoustical ceiling.

The remainder of the meeting was devoted to a series of discussions by Washington officials in charge of departments related to the concrete-masonry industry.

Reporting for the War Production Board, Edmund H. Brooke, chief of the concrete products unit, revealed that farmers are now to be regarded as war contractors, and that their proper needs are to be supplied if possible.

Fred C. Bamman, head of the cement and concrete products unit of the Office of Price Administration, disclosed that all concrete products (as well as ready-mixed concrete) will be placed in a single classification for price regulation, but that prices in effect in March, 1942, will continue to form the yardstick. He stated that relief from undue hardship may be granted on an area basis to remedy price structures upset by low production, and that special prices may be allowed on government contracts in certain cases.

Where a local shortage exists in a particular commodity that is essential to public health or safety, price relief may be granted to encourage production. In such a case, Mr. Bamman added, a joint application should be made by all the local manufacturers concerned, furnishing complete cost data and profit and loss statements.

In regard to requests for price increases based on wage increases made or under advisement by the War Labor Board, Mr. Bamman stressed the importance of notifying the Office of Price Administration as early as possible in writing, so that its investigation can be made at once.

Mr. Dienhart adjourned the convention with an expression of appreciation for the excellent attendance and for the interest displayed at the various sessions.

Recently formed at Seymour, Indiana, to produce concrete products is Burnside, Bock & Company. The firm will also deal in building materials. Incorporators were: E. T. Burnside, Eugene A. Bock, and Tull Burnside.

WANT YOUR MOTO-MIXER TO

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- LAST LONGER?
- OPERATE MORE ECONOMICALLY?

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Here's the book that tells you just what and what not to do to get the most from your Rex Moto-Mixer! It tells you how to clean your machine and how often . . . how to take care of the chain drive . . . how to care for the water system, the drum rollers, drum brakes, transmission, engine and other important parts. You'll find information on lubrication, and complete lubrication charts. And you'll find valuable hints on operating that will enable you to get the most from your Moto-Mixer. There's a check list that will simplify your periodic check ups.

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REX CHAIN BELT COMPANY OF MILWAUKEE
CONSTRUCTION MACHINERY

Efficient Curing System a Feature of Worrall's Newest Block Plant

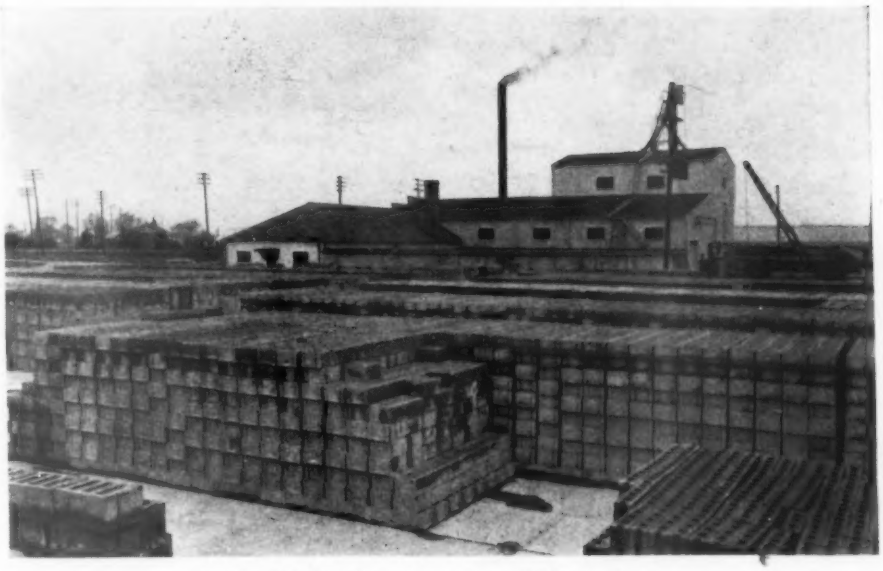
another ON THE SPOT report

THE firm of Worrall Brothers which operates a new and modern concrete products plant at St. Matthews, Louisville, Kentucky, is one of the pioneers of that industry. Operations were begun in a small way in the year 1906 using hand tamp methods, none other, of course, being available in that era. In their thirty-eight years of block manufacturing they have gone along with the progress of the industry and have installed new and improved equipment as it became available. In 1922 a new plant was built and operated for twenty years at 44th and Bank Streets, Louisville.

As the years went on, the residential expansion of the city was mainly eastward and this influenced the decision to build a new plant at Hubbard Lane and the Louisville & Nashville Railway, St. Matthews, a suburb of Louisville. This plant went into operation in March 1942. The old plant was then shut down and will not be operated again. Some of the equipment was incorporated in the new plant. The company has for years handled building materials in conjunction with concrete products. From 1926 to 1937 it operated a sand-and-gravel plant at 34th and Parker Streets in Louisville.

Steam-heating pipes and water trough in one of the curing rooms.

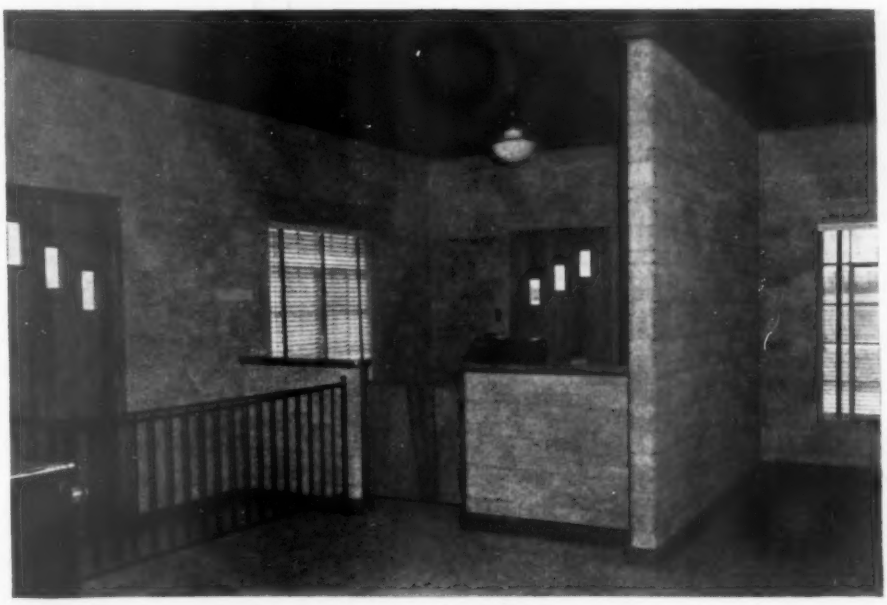
The company employs two salesmen. Some advertising is done and an exhibit is always maintained at the annual home show.



This view of the plant shows some of the yard storage.

The aggregates used in this plant are received in cars or trucks. Sand, gravel, stone screenings, Haydite and expanded slag and cinders are used. Cinders are crushed and graded by a special setup which consists of a track hopper a conveyor, and a New Holland hammer-mill and roll crusher. The sand and gravel and screenings are carried from the main hopper on a belt-conveyor to a Link-Belt bucket-elevator from which it is discharged into the four compartments of the 180-ton steel storage bin. The gates controlling the flow of materials are operated from the ground floor by means of cables. Sand, pea gravel, stone screenings and Haydite or expanded slag are usually stored, but one compartment can be used for cinders if desired.

The aggregates are withdrawn from the bin compartments through gates operated by levers from the floor, into a weigh larry with a 3-beam scale and an over-and-under indicator. From this they are discharged into a 30-cubic foot Besser



This corner of the office shows the drivers' entrance at the left and customers' entrance at the right.

By W. E. TRAUFFER

mixer at floor level, which is driven by a 20-horsepower Robbins & Myers motor through a Texrope drive. The water for each batch is measured by a Buffalo automatic meter. This arrangement has the advantage that defective green blocks can be thrown back into the mixer as fast as they are made until any trouble is corrected. Cement is dumped into the mixer from sacks.

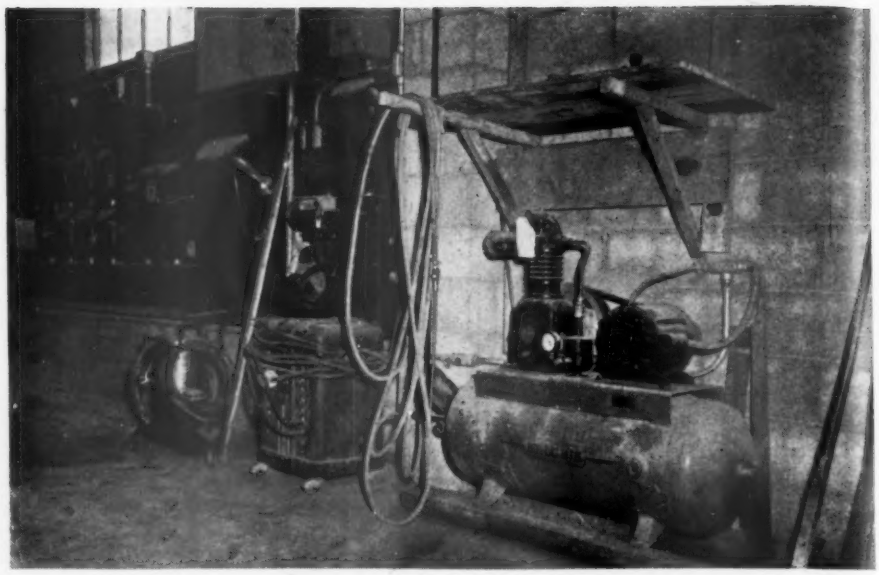
A skip with a 30-cubic foot bucket feeds the concrete to the block machine which is a Besser Super Vibrapac. This machine replaced an older model and is the latest of a line of Besser equipment the company has used in the past 22 years. It is fully automatic and has all the latest features including a Curtis spray system for oiling the plain pallets. The machine has a capacity of

The vibration block machine and air-operated off-bearer.

10 standard blocks per minute. A Curtis air hoist suspended from a swinging beam operates the Besser off-bearer which transfers the blocks to the wooden racks. Lewis and Sheppard lift trucks are used to carry the loaded racks into the curing rooms.

The plant is also equipped to make concrete joists and lintels on two 26-foot-long vibrating tables. Both were made in the company's shop. The length of these tables makes it possible to utilize most of their length even when making short units by combining various sizes.

Near the mixer is a New Holland Number 609 jaw crusher which is used for crushing defective hardened blocks and cleanings from the machine. The crusher product is then remixed with the aggregates. The crusher is driven by a 5-horsepower General Electric motor through Browning Gripbelt V-belts. Other incidental equipment on this floor includes a Curtis air compressor, a Marquette portable a. c. welder and an Alemite pressure lubricator.



Shown here are the switchboard, pressure lubricator, welding machine, and air compressor.

A well-equipped machine and repair shop includes a drill press, 2 lathes, a shaper, etc., in its equipment. There are also form equipment, saws, etc. Carborundum wheels are used to cut blocks and joists.

A feature of this plant is the method used to heat and humidify the four 17- by 70-foot curing rooms. The steam is supplied by a stoker-fired Peerless boiler operating at 15 pounds pressure. On the floor at

Making precast lintels on the 26-foot vibrating table.

each side of each curing room is a metal trough 10 inches wide and 12 inches high extending the full length of the room. Attached to one wall are five double rows of 1¼-inch steam pipes with the lowest coil of pipe inside the trough. The upper four coils of pipe heat the room and the humidity is supplied by the water evaporated from the troughs. A single coil immersed in the trough is used on the other side of the room. A float valve keeps the troughs filled to the desired level.

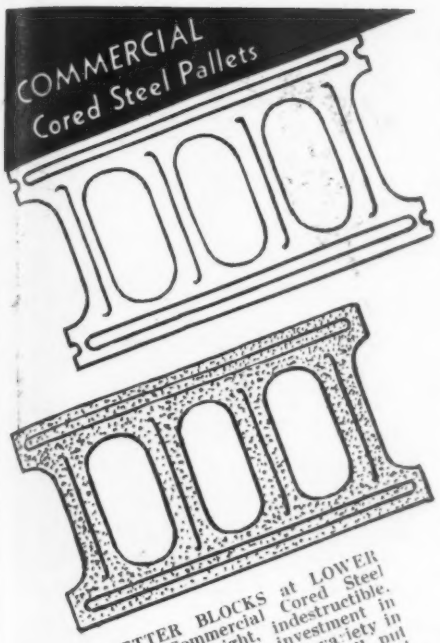
This system is flexible enough to meet varying conditions at different seasons of the year. In the winter all the steam-heating pipes are used but only one of the vaporizing pans in each room is required to maintain the desired humidity. Still further reduction of the humidity is sometimes necessary by lowering the float level of the trough in use. In warm weather the heating pipes are not used, but either one of, or both, the vaporizing units are operated.

The 200- by 200-foot concrete-paved outdoor storage space is another feature. It is sloped enough for adequate drainage and is marked off with black lines so that blocks can be stored in piles in even rows. The aisles are wide enough so that a truck can drive up to any pile for loading. Hand lift trucks are used to haul the loaded racks from the curing rooms. Deliveries are made by six company-owned trucks, a Ford and five Internationals.

The company's output went almost entirely for war-plant construction until early in 1944 when this demand slackened considerably. The largest project was the du Pont powder plant at Charleston, Indiana, which in 1941 took the entire output of this company and five other producers in this area. Even then

Rejected blocks are broken for re-use in this jaw crusher.

COMMERCIAL
Cored Steel Pallets



Make BETTER BLOCKS at LOWER COST with Commercial Cored Steel Pallets. Light weight, indestructible, compact. Require less investment in machinery and permit wider variety in product shapes. Our pallets will put you Blocks *Ahead* in output and profits!

The COMMERCIAL SHEARING and STAMPING CO.
Youngstown, Ohio

For economical Block Production

Picture shows how 2-yd. Sauerman Scraper moves 120 tons of gravel an hour from hill to plant.

IT costs but a few cents per cubic yard to dig, haul and dump a big load of any material with a SAUERMAN Power Scraper or Slackline Cableway. The low cost and large capacity of these machines is proved daily at hundreds of pits and quarries.

SAUERMAN Machines are designed in suitable sizes and types to cover the requirements of every dig-and-haul job and each machine, whether large or small, offers the greatest possible economy of power and labor. *Write for catalog.*

SAUERMAN BROS., Inc.
534 S. Clinton St., Chicago 7, Ill.

many blocks had to be shipped in from Cincinnati and Indianapolis.

In its operations the company has used Haydite, Celocrete, cinders and other light-weight aggregates, especially on government war construction. Its standard mix, however, consists of sand and pea gravel with enough limestone to give the finished block a light color. The mix consists of 50 per cent. sand, 40 per cent. pea gravel and 10 per cent. stone screenings. With standard Portland cement from 22 to 24 blocks are obtained per sack of cement. They have compressive strengths up to 1,500 pounds per square inch. High-early-strength cement is used only for joists and lintels. A record is kept of every mix and each day's production.

The plant, shops, office, boiler room, and curing rooms are all incorporated in a 150- by 175-foot concrete block-walled building, which is painted white outside.

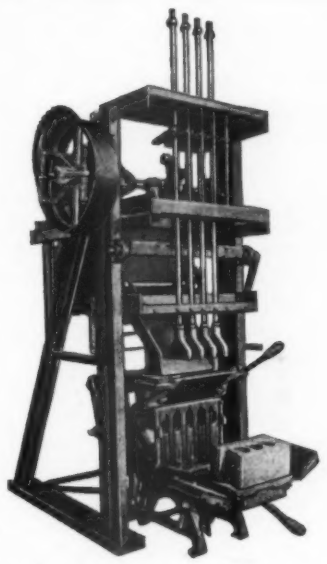
The curing rooms have a concrete roof supported on concrete joists. The office is unusually attractive and incorporates some of the interior effects which may be obtained with plain and scored light-weight blocks. All the departments are partitioned off from each other and stairs and walkways give safe access to all inside and outside equipment including the bucket-elevator and bins.

On December 31, 1943, M. M. Worrall, former president of the company, purchased the entire capital stock and dissolved the corporation and is now operating as an individual under the firm name of "Worrall Brothers."

Module to Coordinate Building Dimensions

Manufacturers of cast stone and of concrete-masonry units generally have shown preliminary interest in "American Standard Basis for the Coordination of Dimensions for Building Materials and Equipment (A62.1)" of the American Standards Association.

This proposed standard establishes a module of 4 inches as the basis of Co-ordination of Dimensions for correlation of building plans and details with materials and equipment having standard, co-ordinated dimensions. Methods through which building plans and details are so correlated are being developed by Study Committee 7, on Building Layout of the American Concrete Institute. This committee will undertake, as rapidly as possible, to disseminate necessary information to designers so that they may understand and support the project.



Recognized Everywhere

The Hobbs Jr. Face-Down Block Machine is recognized everywhere as the great general purpose machine of the concrete-products industry. Famous for its wide range of sizes and the variety of blocks it can produce. As illustrated, it is equipped with striking and finishing device, shown under the floor-type tamper and with power feeder.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
1191 Fairview Ave. Columbus, Ohio

POST-WAR MACHINE NECESSITIES

BLOCK MACHINES
Vibra-Press
and
Tamp Machines

MIXERS
Batch and Continuous

AUTOMATIC FEEDERS
Aggregate or Concrete

ELEVATING EQUIPMENT

TRANSMISSION EQUIPMENT
Pulleys, Hangers, Couplings, Clutches

PALLETS
Semi-steel cast or sheet steel

PALLET CLEANERS

The Kent Machine Co.
Cuyahoga Falls, Ohio

Concrete Pipe (*from page 130*)

terial, making it possible to obtain allocation of reinforcing steel in advance of requirements. Mr. Kauer discussed the committee hearings at Washington in which every effort was made to secure an essential classification for the concrete-pipe industry. Although the request was denied, he said that some companies have succeeded in obtaining local relief. Similar efforts, Mr. Kauer disclosed, were put forth in regard to Maximum Price Regulation 251, which is now definitely out of the picture so far as concrete pipe is concerned. He predicted that M. P. R. 188, under which the concrete-pipe industry is now controlled would shortly be revised to cover new manufacturers, locations and products.

Mr. Kauer closed his report with a detailed analysis of trade-association functions and activities, prepared at the request of the executive committee on the expansion of activities.

The Committee on the Expansion of Activities next submitted its report in the form of a resolution urging the employment of a managing director to operate the affairs of the association, with Mr. Loving serving as director of engineering and consultant. The report also urged the development of a brand or mark of quality as part of a vigorous advertising program, and suggested that study be given to the possibility of finding a new location for the offices of the association.

The afternoon session opened with an address on *Airport Design Problems* by O. J. Porter, senior physical testing engineer, Division of Highways, Sacramento, California. Commenting on the great increase that has occurred in airport runway loads over a span of a few years, Mr. Porter stated that tests are now in progress on planes with wheel loads of 100,000 to 200,000 pounds. While there are fewer load repetitions on runways than on highways, he predicted that heavier air traffic in the future will introduce the problem of fatigue into the design of runway slabs.

Contrary to a popular conception, Mr. Porter disclosed that runways do not fail from impact on landing. This is explained in part by the fact that the load is largely air borne, and in part because both soil and water are solid when struck a sudden blow. A much more serious condition occurs when the load moves very slowly, and there is an opportunity for excessive flexure to bring about failure.

K. D. Briggs, Pittsburgh Steel Co., Atlanta, and three representatives of the Shearman Concrete Pipe Co.: J. N. Atkins, Nashville; Robert Cobb, Jacksonville; and A. J. Bottiger, president, Nashville.

In discussing the importance of proper drainage in airport design, Mr. Porter stated that if drain lines are properly backfilled, the backfilling material can take almost the entire load. He concluded his talk with the showing of a number of pictures, graphs and oscillograph studies of highway and runway failures.

The remainder of the session was given over to a discussion of the proposed expansion of association activities.

E. F. Bespalow, chairman of the Technical Problems Committee, opened the third session on Thursday morning with a report on the association's trench tests of concrete pipe. He stated that the tests made to date indicate that concrete pipe, with proper backfill and compaction will carry any load within the supporting capacity of the surface material.

It was brought out that the Portland Cement Association has offered to contribute $5,000 to the cost of the research if proper sponsorship could be obtained and a satisfactory program developed. Mr. Bespalow submitted a figure of $25,000 as the probable cost of carrying on the program if it should be placed under the sponsorship of the Highway Research Board.

During the business session that followed Mr. Bespalow's report, the membership voted to adopt the resolution pertaining to the expansion of association activities.

At the final session of the convention the following officers and directors were elected: O. H. Miller (Choctaw Culvert & Machinery Co., Memphis, Tennessee) to succeed W. E. Corbett as president. First Vice-President: Elmer L. Johnson (Concrete Conduit Co., Colton, California); Second Vice-President: T. D. Bailey (The Cretex Companies, Inc., Elk River, Minnesota); Third Vice-President: E. E. Brainard (Tack Joint Pipe Co., Ampere, New Jersey). New directors for the forthcoming year will be W. E. Corbett, J. E. Miller, H. A. Weigand, C. A. Bluedorn, J. D. Mollendorf, and C. H. Bullen.

Cromis New President of Sand-Lime Brick Assn.

Since many of its members are now producing concrete units as well as sand-lime bricks and blocks, the Sand-Lime Brick Association, following the custom of recent years, held its annual one-day business meeting at the Hotel Sherman on February 14, the day preceding the opening of the National Concrete Masonry Association convention. The meeting was largely devoted to a round-table discussion of the affairs of the association and to the matter of high-pressure-steam curing of concrete units.

Ralph E. Cromis of the Boice Builders Supply Company of Pontiac, Michigan, was chosen president; Leo J. Ryan, Ryan Fuel & Supply Company, Windsor, Ontario, vice-president; and Elmer R. Coats, on leave for military service from the Mutual Materials Company, Seattle, Western executive secretary. J. Morley, Zander of the Saginaw Brick Company, Saginaw, Michigan, was re-elected secretary-treasurer.

Ballast Blocks Trim Steamships of War

With the longest supply lines in the history of warfare, and by far the largest volume of men and materials to be transported, any hull that would float, from tramp to luxury liner, was pressed into service. Shipping men took what they could get and adapted it at record speed to any given set of requirements. A 10,000-ton cargo-carrier might carry 2,000 troops and 3,000 tons of cargo, while vessels never intended for cargo at all, were pressed into service to carry urgently needed supplies. With shipping space at a life-and-death premium, even the broad decks of tankers carried planes, jeeps and trucks.

Fitting the hull to the work in hand was a tough assignment for marine engineers to lick, but lick it they did. The basic problem was to bring each ship to a practical waterline where she handled best. A ship sailing too light would be at the mercy of wind and wave, hard to keep on course or at station in convoy. A hull drawing more water forward than aft would be equally difficult to handle. The time-honored practice of pouring concrete into the bilge was out, because on the very next trip, the ship might have an entirely different job.

The answer to the problem was concrete ballast blocks. Using heavy slag aggregate, these solid 3⅜ by 8 by 12-inch precast units, weighing about 33 pounds each and 170 pounds per cu. ft., were developed by Louis Gelbman, vice-president of Concrete Units, Inc., Bronx, New York. This plant turns out ballast blocks by the 700-ton bargeload. The size is handy—in an emergency, one could pipe all hands, form a line and pass ballast blocks to trim ship, or remove them in jig-time to make ready for a different type of job.

The new vibrating-mold machine.

Cast Stone Institute Meets in Chicago

The convention of the Cast Stone Institute held February 14 and 15 at the Bismarck Hotel, Chicago, lived up to the reputation which the meetings of this group have acquired as being occasions for hard work. Attention this year was about equally divided between post-war planning and an exchange of ideas as to how the industry might best continue to do its bit in helping to finish the war.

A far-reaching step was taken in the adoption of a plan to encourage the pooling of new ideas and new products as conceived by individual members. A special fund was set up through which such ideas or products can be developed and perfected far beyond the point to which they could be carried by the originator alone. It is confidently expected that this arrangement will make nationally available a host of precast concrete items which might otherwise not be developed beyond the stage of local application.

Looking to post-war construction a plan under which cast-stone plants would undertake the manufacture of Glastone, a new glass-faced concrete building unit, was presented by E. C. Johnson of the Libbey-Owens-Ford Glass Company. This material was received with enthusiastic interest as offering wide possibilities in fields heretofore not open to cast stone.

Officers and directors of the Institute were re-elected as follows: president, E. A. Wiedemann, Economy Cast Stone Company, Richmond, Virginia; vice-president, Edward Olsen, Badger Concrete Company, Oshkosh, Wisconsin; secretary-treasurer, O. L. Formigli, Formigli Architectural Stone Company, Berlin, New Jersey; directors, L. G. Young, George Rackle & Sons Company, Cleveland; A. J. Downing, Edmonds Art Stone Company, Washington, D. C.

C. G. Walker, Washington, D. C., continues as managing director.

● New Block Machine

Known as the Little Giant, the vibrating block and tile machine being manufactured by Appley-Owens, Inc., of St. Petersburg, Florida, has a capacity of 100 to 120 standard concrete units per hour. It is powered by a ¾-horsepower motor equipped with an electric brake to stop the operating cycle in a split second.

The feature of the machine is the fact that the mold box itself vibrates, the cores remaining stationary, insuring sharp, square corners on the finished block and smooth faces.

In operation, the concrete mixture flows from a feed hopper into a trough which supplies the mold box. The operator assists in distributing the mix uniformly in the box by means of a wooden spreader. He then steps on the pedal which vibrates the mold box for about ten seconds. The hopper is then pushed back, the unit is ejected upward by means of a counterweighted lever and removed by the off-bearer. The cycle is then repeated, 30 seconds being the usual time for making a complete block.

The Little Giant occupies a floor area of only 30 by 36 inches. Bronze and roller bearings are used, the mold box being lined with nonabrasive material for long life.

NAT-ALOY WIRE CLOTH

☒ VOTE "YES"

For this dependable, non-crystallizing, long-wearing Screen Cloth with "Nat-Aloy" Lock Crimp Meshes.

"IT'S THE PEOPLE'S CHOICE"

among profit-wise producers for precision separation and economical operation.

Stock shipments in all widths and all meshes. . . . Write for catalog No. 55.

NATIONAL WIRE CLOTH CO., INC.
252-270 W. FAIRFIELD AVE. — ST. PAUL, MINN.

HAS THIS EVER OCCURRED TO YOU?

If you would do a "land office" business after the war, get ready for it NOW. That means equipment—including bins to store and load sand and gravel for fast deliveries on road, street, housing projects.

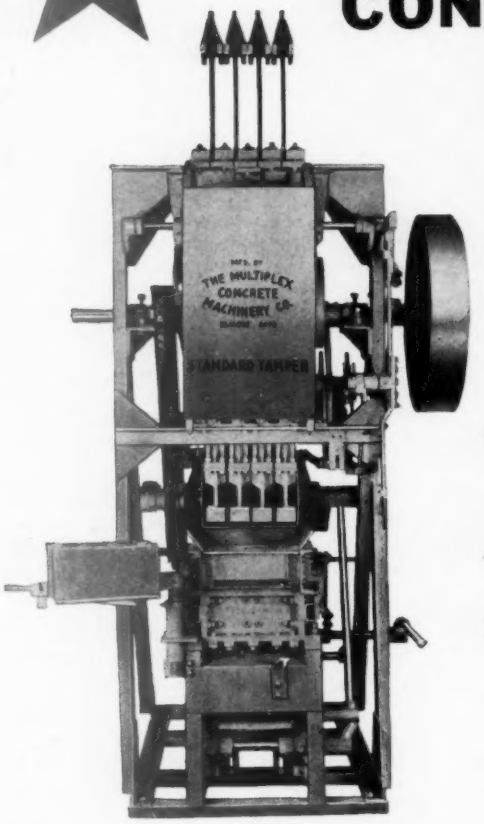
Neff & Fry super-stave bins—the capacities you want—the conveyor you need—will serve you well, Demountable for re-erection, hence good for many years. Send for catalog. Get all the facts.

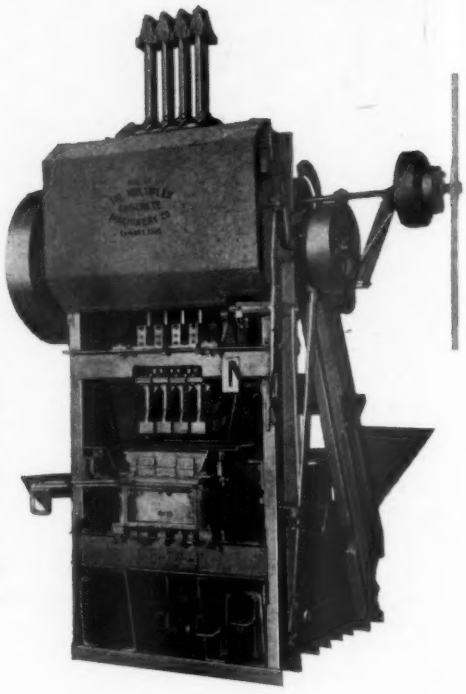
THE NEFF & FRY CO.
CAMDEN, OHIO

N & F BINS

The CONCRETE MANUFACTURER

MULTIPLEX
CONCRETE BLOCK
Machines

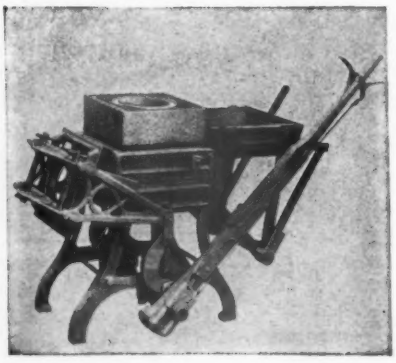




THE ALL-STAR
Production
cast for 1944

MULTIPLEX STANDARD TAMPER is a universal machine for making both plain and stripper, or face blocks, on one base. This is the ideal starting unit, as changes can be made quickly and easily to accommodate expanding business. The STANDARD model is supplied with 4-bar or 8-bar tamper, either power or hand operated. Rugged, all-steel welded frame and reinforced moldbox.

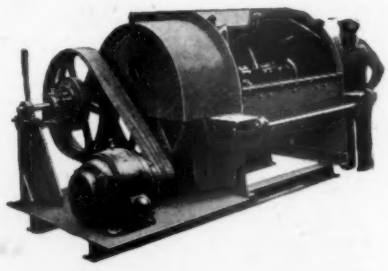
Here's a profit-and-production headliner—the famous MULTIPLEX SUPER-TAMPER with 8-bar tampers. It's designed and built to produce perfectly finished brick, tile or block units on a low cost and maintenance basis. Has positioned-timed feeding and stripping, and quick action 5-point clutches. Handles all kinds of aggregates. Produces 4 to 6 top quality units per minute.



The MULTIPLEX Flue Block Machine makes ventilated, solid or lightweight flue blocks, including all necessary attachments for ventilator and stove pipe openings. A "must" machine for thrifty producers.

You can't match our Model C Double Stripper for all around reliability in a hand-operated machine. Makes two perfect plain or faced blocks at a time, in all sizes from 3" to 12" wall, and 16" length. Convertible for ashlar work and random sizes. Capacity up to 750 units per minute.

100% efficient products-plant use our MULTI-MIXER to insure faster and more thorough mixing of any concrete batch. Unique paddle design and reverse screw-type mixing action keep product costs low and product quality high. MULTI-MIXERS are available in sizes up to 60 cu. ft., either side, end or bottom discharge.



Write for Booklet describing our complete line of equipment and vibrating machines.

MULTIPLEX
CONCRETE MACHINERY CO.
Frank Muenzer, President
Elmore **Ohio**

There is a Barber-Greene to meet your material handling problems—from pit or quarry to stockpile to truck to processing plants. Portable and Permanent Conveyors of standardized sectional construction for rapid set up and easy alteration. Bucket Loaders for high capacity, low cost loading of trucks from ground storage. Write for literature.

PORTABLE CONVEYORS

LEFT: 60′ B-G Belt Conveyor mounted on swivel truck stockpiling from portable crushing plant in gravel pit.

BUCKET LOADERS

CENTER: B-G 552 Bucket Loader loading truck from processing plant stockpile. Feeding spirals give B-G Loader excavating ability and positive feeding of buckets.

PERMANENT CONVEYORS

Top photos show B-G Permanent Belt Conveyor used to supply aggregate to bin for batching to ready mix trucks. Raw aggregate is dumped into feeding hopper at right by trucks and B-G Conveyor elevates aggregate to bin.

44-23

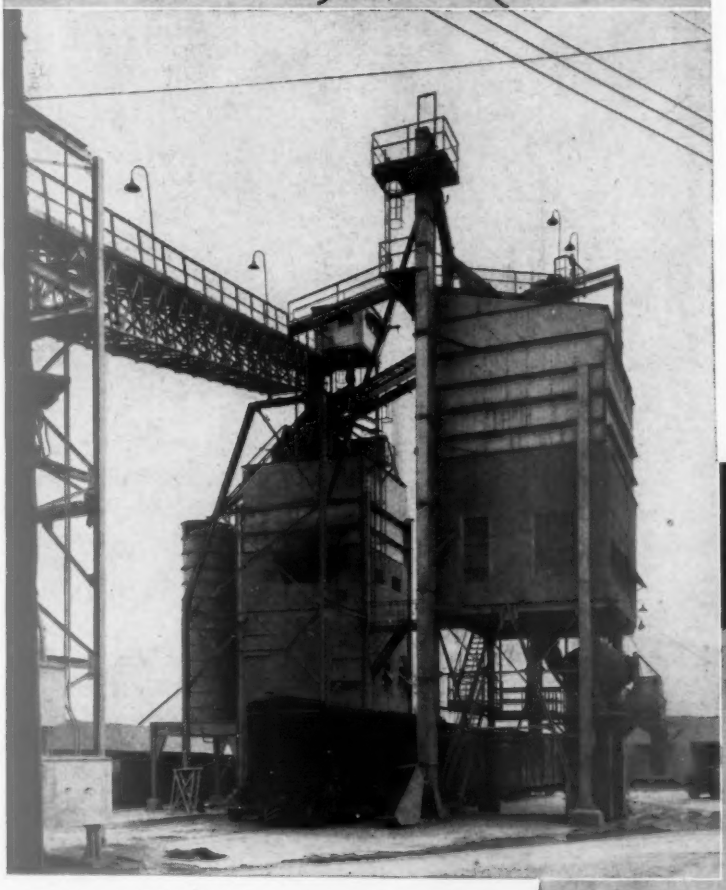
BARBER-GREENE

AURORA, ILL.

LET'S ALL BACK THE ATTACK — 4th WAR LOAN

VERSATILITY PLUS!

TRANSIT-MIXED CONCRETE PRE-MIXED CONCRETE ASPHALT-COATED SHELL SAND GRAVEL SHELL CEMENT ASPHALT SALT	LOADED INTO	TRUCK MIXERS AGITATORS BATCH-TRUCKS RAILROAD CARS



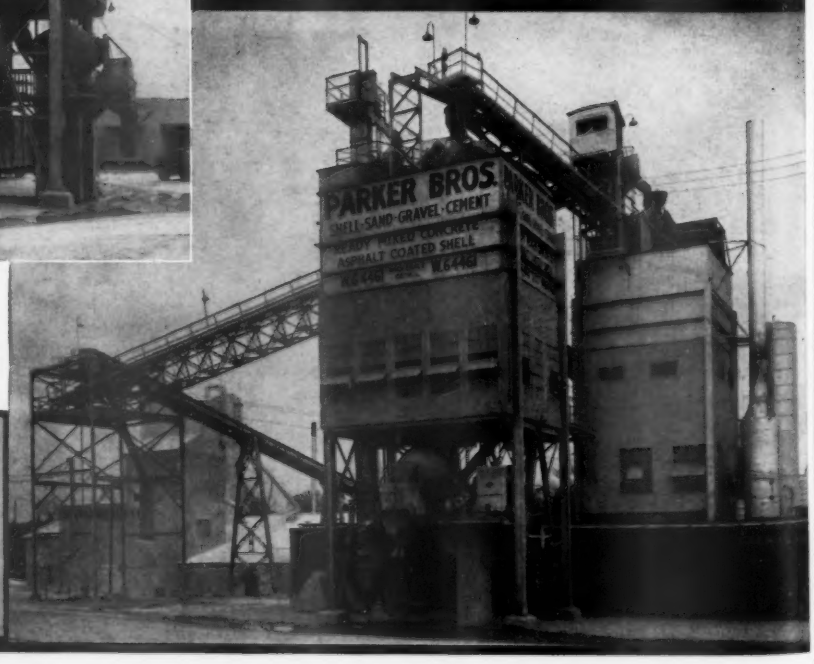
Texans have a reputation for doing things on a grand scale. No exception is the Parker Brothers plant at Houston — one of the largest, and certainly the most versatile, in the U. S.

Nearly a year was spent making layouts of the proposed plant, but none was satisfactory. Then a Butler engineer was called in. This amazing plant was the result — one that will literally do everything but mind the baby!

A complex conveyor network transports materials from barge, railroad, and truck to storage pits and mixing plants. One conveyor even delivers material to a customer next door! The mixing plants, too, are neither small nor simple; the 409 yard concrete mixing plant alone stores ten materials, an additional eight being handled by the 303 yard shell mixing plant.

The plant's astonishing list of products clearly indicates its versatility, and its compact yard and efficient operation attest to the careful planning of its layout. Little wonder that this, another Butler Engineered Design, is one of the nation's truly outstanding plants.

BUTLER BIN COMPANY WAUKESHA, WIS.



Engineered Design means the difference between "just another plant" and one that is outstanding. Large or small, simple or complex, submit your plant problems to Butler engineers. Write today for literature.

Engineered BUTLER Design

BARRETT LIFT-TRUCKS

ONE MAN HANDLES 48 BLOCKS
NO BREAKAGE

Handle your green concrete products the way that more than 800 other concrete products plants do. WITH BARRETT LIFT-TRUCKS EQUIPPED WITH A SUPER-SPRING FRAME AND RUBBER TIRES. Eliminate breakage — joggling out of shape and spoilage. Save time, money and labor by eliminating all unnecessary handling and breakage. Take your blocks direct from the machine to the curing room—with ease and dispatch. One man handles 48 blocks of the 8x8x16 size—or, 32 blocks of the 8x12x16 size.
Write for illustrated circular.

BARRETT-CRAVENS COMPANY
3251 West 30th Street CHICAGO, ILL.
Representatives in all principal cities

FASTEST POURING

Almost Any Job of Concrete Can be Done Faster with JAEGER TRUCK MIXERS

"HIGH DUMP"

Millions of yards of Jaeger Truck-Mixed Concrete on major war work (exceeding the output of all other makes combined) prove the advantages of these motorized concrete plants. Nimble, flexible and fast, they speed placement, solve problem of extended or continuous pours.

or "LOW CHARGE" Type

THE JAEGER MACHINE CO.,
602 Dublin Avenue
Columbus, Ohio

Mixers—Pumps—Hoists
Paving Equipment

Farm Structures are War Equipment

Helping farmers make improvements that increase food production is a major war job for concrete contractors and concrete products men. Gains in food production at home help gains on the fighting front.

Facilities that save farm labor are sorely needed. Many existing farm structures need repairs for increased usefulness.

Concrete construction uses minimum of scarce materials; saves war transportation because bulk of concrete materials is usually available locally.

PORTLAND CEMENT ASSOCIATION
Dept. 3-58, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

Keep them FIT and FIGHTING!

ADD a Concrete Pipe Plant the UNIVERSAL WAY

Make Both Large and Small Pipe Profitably

UNIVERSAL not only offers an "all-purpose" machine to produce every size of concrete pipe from 6" to 48" but also equipment for larger sizes such as the 135" pipe we have furnished for highway work.

You are assured of getting superior equipment to produce the finest pipe at a profit from UNIVERSAL.

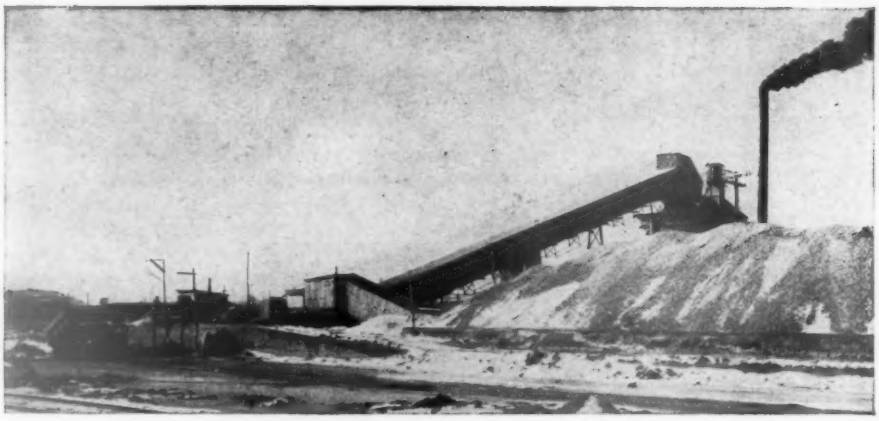
It is better to own a UNIVERSAL machine than compete with one.

Write today for catalog and details.

UNIVERSAL
CONCRETE PIPE CO., Inc.
COLUMBUS, OHIO

CONCRETE MANUFACTURER

NEARLY NEW CONCRETE BATCHING PLANT



Capacity 250-350 Cu. Yd. Per Hour . . . Available for Immediate Delivery.

Complete Butler concrete plant. Excellent condition, used only 7 months. Adaptable for either commercial or construction use where high rate of concrete pour may be required. Equipped for manual, semi-automatic or automatic operational control. See details below.

BATCHING BIN. Bin—250 yd. capacity—190 yd. 3-compartment aggregate 400 bbl. cement.

2 BUTLER CEMENT STORAGE BINS. 2,000 bbl. capacity, 2-compartment, 3,000 bbl. capacity, single compartment. All bins equipped with air jets and steam jets.

BATCHERS. 1 Butler aggregate 5 yd. capacity, complete with beam-type scale, manual operation.

1 Butler cement 3,000 lb. capacity, complete with beam-type scale, manual or automatic operation.

1 Butler water batcher 200 gals. capacity, beam-type scale, complete with 400 gal. surge tank and valves, manual or automatic operation.

ELEVATOR & TRACK SCREW. 300 bbl. per hour capacity, screw 37 ft. long, equipped for either box car or hopper car cement delivery. Complete with 20 hp. electric motor.

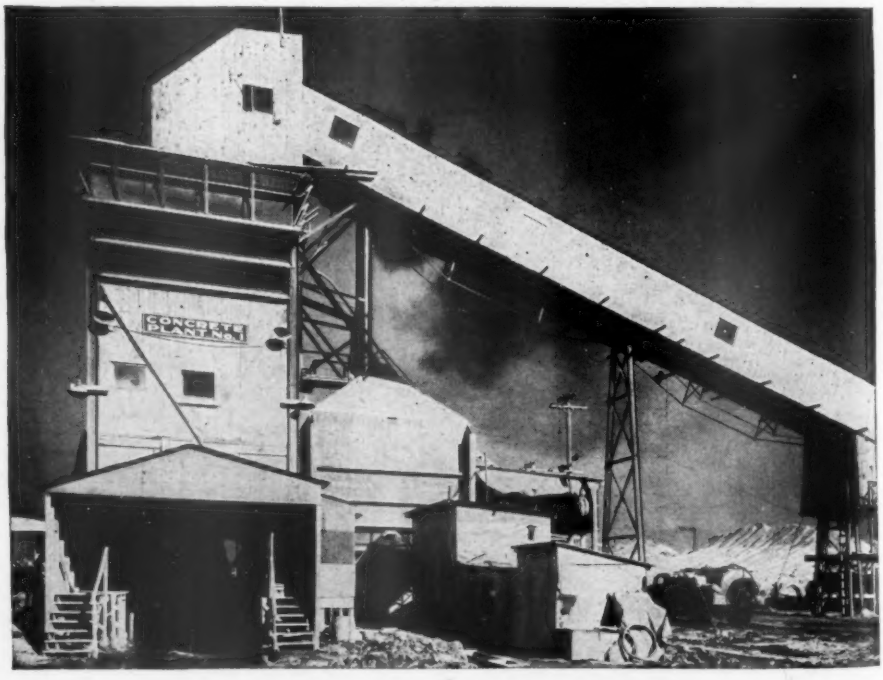
CONVEYORS. 1 Barber Greene 36" inclined conveyor 224'6" long, equipped with: 50 hp. Century motor; one 40 yd. track hopper; one 20 yd. track hopper; one 20 yd. truck hopper. All necessary A frames, trusses and supports included. All hoppers equipped with discharge gates.

1 Barber Greene 36" horizontal conveyor 129'6" long. Complete with 18 double clam-type fill valves, 20 hp. Century electric motor complete with trusses.

1 Barber Greene 36" inclined conveyor 60'6" long. Complete with 15 hp. electric motor, trusses and supports.

These conveyors were used only 6 months under cover. They are in excellent condition and include band type brake, pivoted distributor, ground level control and Alemite one-side system of lubrication. We have an extra 500 feet of brand new pre-war belting available with this plant or conveyor system.

MISCELLANEOUS. Collecting hopper under batcher, 5 feet cement screw feeder complete with motor for automatic control of cement. Traveling hopper for charging batch trucks. Extra cement buckets, drive chain, elevator chain for cement elevator and track screw, etc.



WE WILL CONSIDER THE SALE OF THIS EQUIPMENT IN UNIT SECTIONS AS FOLLOWS:

1. Concrete plant complete, including cement elevator, conveyor system, and one cement storage bin.
2. Concrete plant alone without cement storage bin or conveyor system.
3. Conveyor system alone.
4. Either or both cement storage bins with or without cement elevator and track screw feeder.

Also 19 Late Model Transit Mixers

8—1942 Model Jaegers — High discharge, separate engine drive with two speed transmission: 4 mounted on 1942 Dodge trucks; 6 wheel tandem drive—all in excellent condition with good tires.

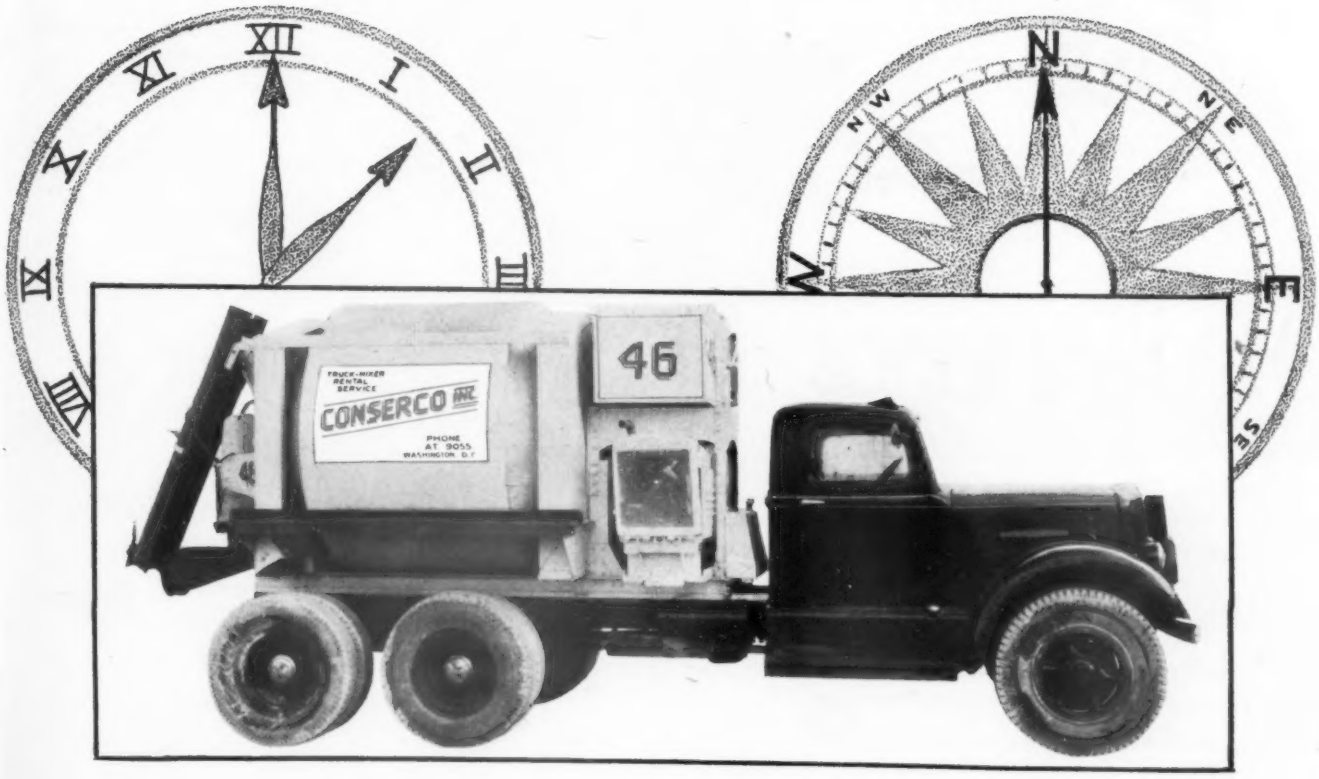
11—1942 Model Smiths, all high discharge type with separate engine drive. 2—3½ yd. capacity on Mack trucks. 2—3½ yd. capacity on Autocar trucks. 1—4 yd. capacity on White truck.

MOTOR TRUCK SALES AND EQUIPMENT COMPANY

2435 COTTAGE GROVE AVENUE **Telephone: CALUMET 1255** **CHICAGO, ILLINOIS**

Deliver CONCRETE the CONSERCO Way

...Anytime ...Anywhere



Truck Mixer Rental Service

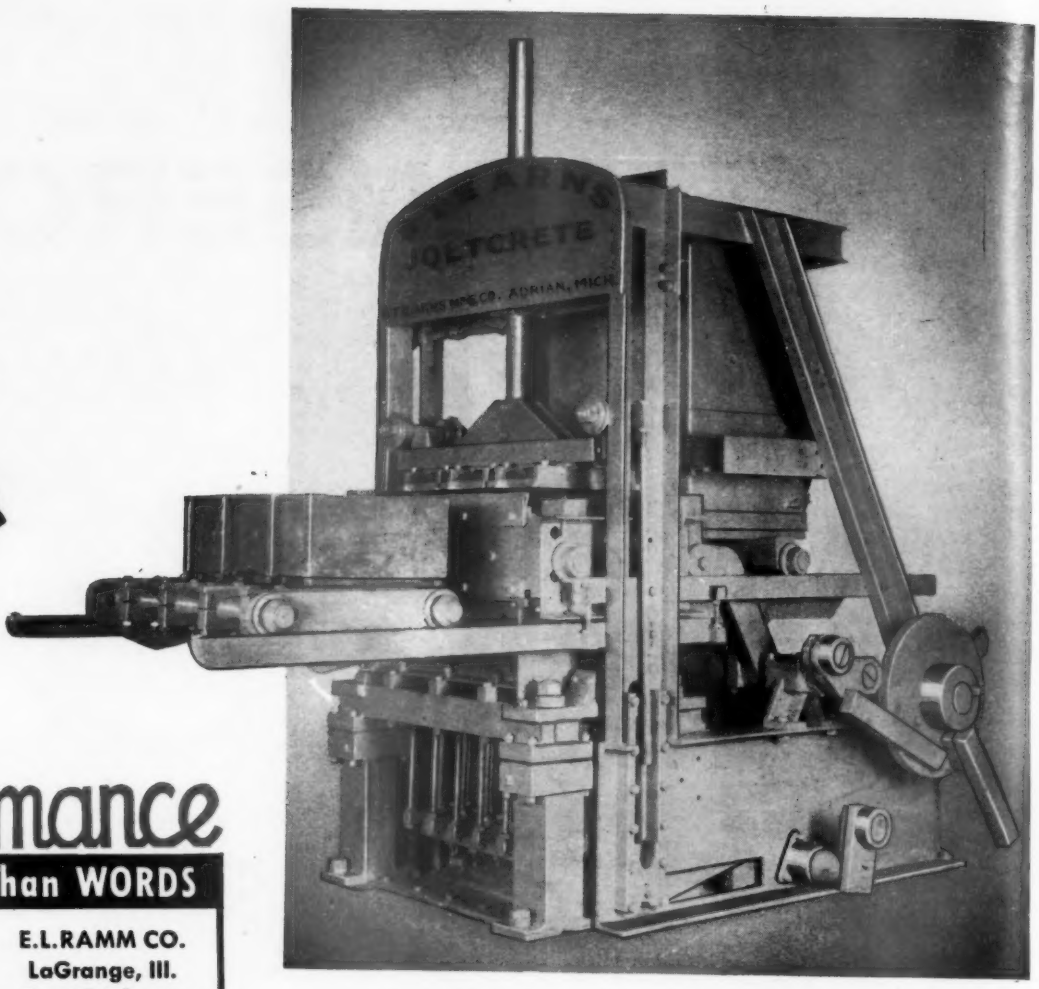
Around the clock . . . across the country . . . contractors are profitably taking on jobs made available by the CONSERCO truck mixer rental service.

CONSERCO supplies complete facilities for delivering concrete on any scale . . . 3, 4, or 5 yd. truck and mixer . . . truck and mixer maintenance . . . experienced driver . . . truck delivered to the job . . . gasoline . . . insurance . . . oil.

Write for full details, including rates.

CONSERCO, INC., 1600 South Capitol St., Washington, D. C.

Phone ATlantic 9055 **Long Distance 1200**



STEARNS Joltcrete No. 9, illustrated above, easily produces from nine to eleven 8x8x16-in. blocks per minute—blocks that are dense, true-to-dimension and entirely free from core bar and other cracks. Other models of lesser capacity.

Performance
Speaks Louder than WORDS

STANDARD CONCRETE PRODUCTS CO.
York, Pa.
Two #7 Joltcretes

E.L.RAMM CO.
LaGrange, Ill.
One #7 Joltcrete

HUDSON SUPPLY & EQUIP. CO.
Washington, D.C.
Two #9 and two #7 Joltcretes

ask a STEARNS owner

When You Buy STEARNS—
You Buy "KNOW-HOW"

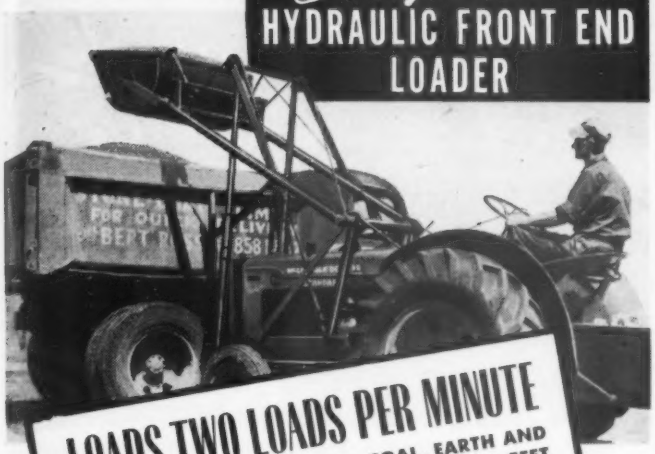
In the field of concrete products manufacture STEARNS represents the combined experience, the "know-how", of two generations devoted *exclusively* to the design and production of concrete products plant equipment.

STEARNS pioneered the development of machines for producing concrete masonry units by vibration. The result was, and still is—*Stearns Joltcrete Machines.* Facts and figures, which we will gladly submit, clearly prove them to be the most economical machines of their type your money can buy. They represent what we mean by "know-how"—the "Know-How" that stands as a promise of satisfaction behind our name.

STEARNS
MANUFACTURING CO. ADRIAN, MICH.
GENE GLEEN, PRESIDENT

Licensed under the basic Gelbman Vibration Patents. Also manufacturers of Clipper Stripper block machines (tamp type). Mixers. Skip Loaders.

The Ottawa "Jay-Hawk" HYDRAULIC FRONT END LOADER



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LIFTS ½ YARD SAND, GRAVEL, COAL, EARTH AND OTHER BULK MATERIALS TO HEIGHT OF 8 FEET

The tractors you now operate can do other tough jobs when equipped with The Ottawa Jay-Hawk Hydraulic Front End Loader. Shovel unit quickly attached or detached without altering tractor.

Available for INTERNATIONAL Models I-4, I-6 and ID-6

Makes Tough Jobs EASY!

Prompt delivery . . . write TODAY for full information and prices

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Ottawa STEEL PRODUCTS, Inc.
OTTAWA, KANSAS • U. S. A.

Some Day DAVENPORTS Will Again Be Available

STEAM—GASOLINE—DIESEL LOCOMOTIVES—ELECTRIC OR MECHANICAL DRIVE

STEAM—GASOLINE—DIESEL LOCOMOTIVES—ELECTRIC OR MECHANICAL DRIVE

ARMY E NAVY

Post-war public works will open new opportunities for your business. That's when the extra values in Better-Built Davenports will be most appreciated. We cannot accept private orders now—but—we can assist you in planning "Haulage by Davenports" for your future operations.

Better-Built Davenports deliver superb performance with top efficiency and extra years of trouble-free operation. We will gladly analyze your requirements as a preliminary to prompt deliveries when the time comes for post-war action.

Entrust Your Post-War Haulage to Modern Davenports

EXPORT OFFICE BROWN & SITES 50 Church St., N. Y. Cable Add. 'Brosites"

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

36 Years Experience + Vision for Tomorrow

Make "American Rubber" Products Timed for Today's Needs

It's this long experience . . . plus our practice of always looking ahead . . . that have enabled us to meet the emergencies brought about by this global war.

• Lightning Ribbed Center Conveyor Belt has yet to meet a moisture problem it could not solve. As for tonnage, it handles the most per dollar of cost.

Experience, plus Vision, have enabled us to develop Ar-Polene, the American synthetic, and to use it in such a manner that, in many cases, it is superior to natural rubber.

Now, just as in normal times, you can depend upon "American Rubber" products for today's needs, and for tomorrow's.

The AMERICAN RUBBER Manufacturing Company

Factory and General Offices: Park Avenue and Watts St., Oakland 8, California

Uniform Separation

Chemicals—Metallics—Non-Metallic Minerals

The new model GAYCO Centrifugal air separator makes possible the uniform and increased recovery of fine material within a range of 40 to 400 mesh.

- Greater Capacity
- Cleaner Trailings
- 99% Through 325 Mesh
- 25% to 30% greater recovery of fines.
- Not affected by variation in speed or rate of feed.

Manufacturers also of "Reliance" Crushers, Screen, Elevators, Conveyors, Bin Gates, Grizzlies. Complete crushing, screening and washing plants for crushed stone, sand and gravel.

Universal Road Machinery Co.

RUBERT M. GAY DIVISION 117 Liberty St. New York 6, N. Y.
Canadian Representative: F. H. Hopkins & Co., Ltd., Montreal
FACTORY & LABORATORY, KINGSTON, N. Y.

GRUENDLER CRAFTSMANSHIP

Serving Industry over 50 Years

150 TO 200 TONS PER HOUR, CRUSHING HARD ROCK

Steam Shovel rock reduced to 5" to 6" minus in one operation.

These heavy plate steel constructed roller bearing jaw crushers have tremendous crushing power, take most severe punishment.

The complete weight of above crusher is 54,200 lbs.

Mfgrs. of Portable Jaw or Hammer Crushers and Heavy Roll Crushers

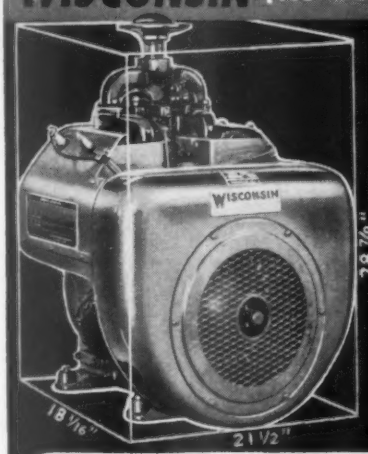
Bulletin mailed on request.

GRUENDLER

CRUSHER and PULVERIZER CO.

2915-17 North Market St., ST. LOUIS (6), MO.

WISCONSIN *Air-Cooled* **ENGINES**



Check for **SIZE and POWER ON YOUR EQUIPMENT**

If you are interested in engines . . . either "on the board" for post-war equipment, or "on the job" for immediate applications . . . you can't go far wrong if you include Wisconsin air-cooled engines in your specifications.

The Model VE-4, dimensionally illustrated above, is a typical example of the extremely compact power packages that carry the Wisconsin name plate. This 4-cylinder engine delivers 22 hp. at 2600 rpm. Other Wisconsin sizes run from 1 hp. to 31 hp. Check for Size and Power on your equipment.

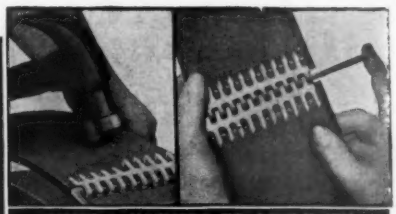
Most H.P. per pound

WISCONSIN MOTOR Corporation

MILWAUKEE 14, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

BELT LACING and FASTENERS for transmission and conveyor belts



"JUST A HAMMER TO APPLY IT"

ALLIGATOR

Trade Mark Reg. U. S. Pat. Office

STEEL BELT LACING

World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

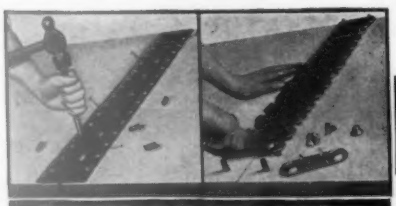
FLEXCO HD

BELT FASTENERS AND RIP PLATES

For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

Sold by supply houses everywhere



"CONVEYOR BELTS EASILY FASTENED"

FLEXIBLE STEEL LACING CO.

4623 Lexington Street
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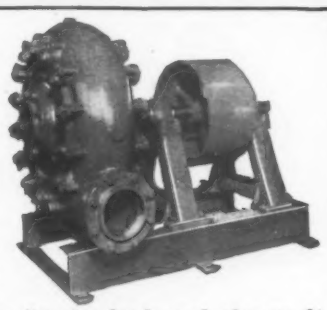

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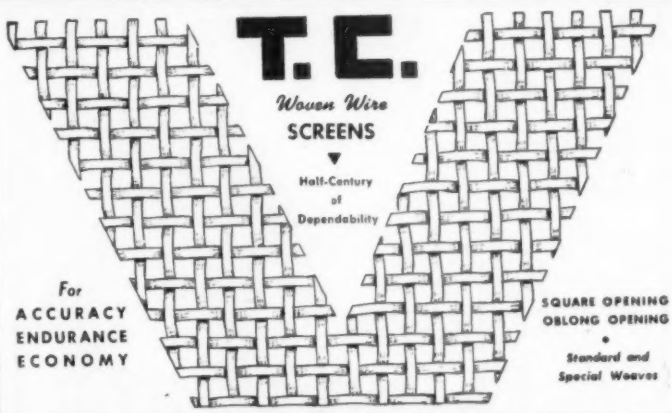

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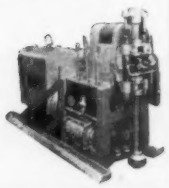

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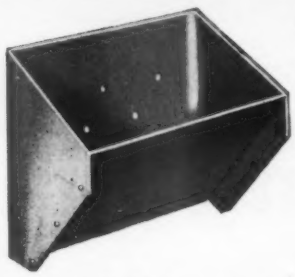

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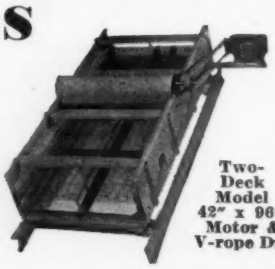

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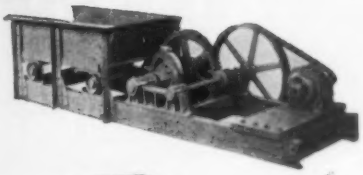

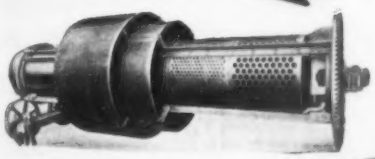

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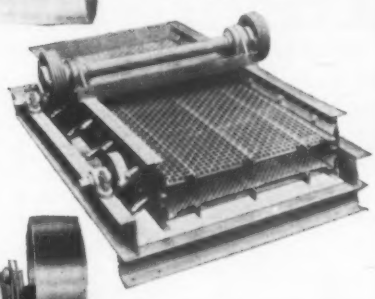

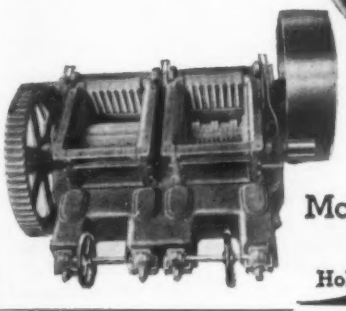

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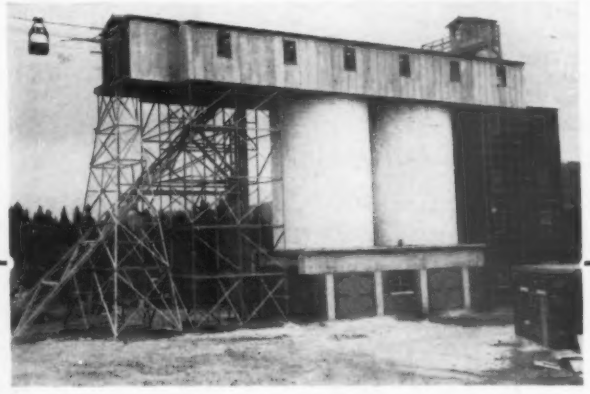

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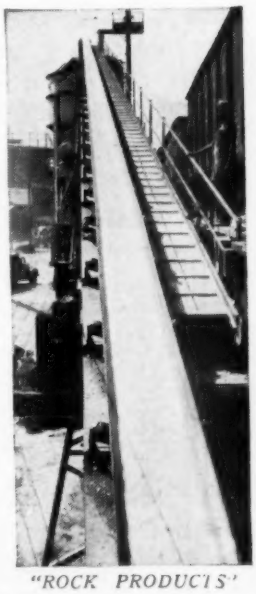

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42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

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HEAVY-DUTY FRICTION SURFACE

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16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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	25 "	10.00
	35 "	14.00
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1"	25 "	10.00	3.50 "
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¾ to 2½ yards shovels and draglines, gas or diesel.

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late model diesel tractors, bins and batchers.

ALSO

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FULLY REPAIRED
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Available Immediate Delivery

0-4-0 Saddle Tank—32½ tons
Standard Gauge
Built 1917
Boiler ASME
Tractive Effort 14,400 lbs.
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A DEPENDABLE SOURCE for
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CARS — CRANES — COMPRESSORS
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WE WELCOME YOUR INQUIRIES
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Osgood "Chief" 2 yard Shovel, gas.
P & H 600 Shovel, Crane & Dragline.
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Bucyrus-Erie 50B Steam Crane, 100′ boom.
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Bucyrus Erie 41B Shovel & Crane, Steam
Bucyrus Erie Model 50B, 2 yd. comb. Shovel-Crane
Bucyrus Erie 1 yard Steam Crane, excellent
Bucyrus Erie Model 1030 Electric Tunnel Shovel
Koehring 301 Shovel & Crane, ¾ yd.
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Brownhoist 5-7½ ton Gas Crane, 30′ boom

SPECIALS!!
Kennedy-Van Saun Revolving Screen 4′ x 18′.
Steel Stiff-leg Derrick, 35 tons, 100′ bm.
Allis-Chalmers cent. pump, electric, 3500 GPM, 50′
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Butler 16 cu. ft. Asphalt Pug Mill

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⅞ yd. Blaw-Knox Clamshell, digging
⅞ yd. Hayward Clamshell, digging
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⅝ yd. Williams Clamshell, digging
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¾ yd. Haiss Clamshell, rehandling
Erie ¾ yd. Clamshell, rehandling
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Cletrac FD Tractor with Heil 12 yd. Scraper Wagon
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Caterpillar D6 Tractor with bulldozer
Allis Chalmers L Tractor with Baker bulldozer

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Gyratory Crushers: K.V.S. 30, 37-S, 49; Traylor 8″; McCully 13″, 8″, 6″
Jaw: 10x22, 10x24, 11x18, 12x24″, 14x24″, 16x32, 56x84″
Complete Rock Crushing Sand & Gravel Plants

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American 60 ton, steam, std. ga.
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Porter 13 ton, Steam Saddle Tank, 36″ gauge
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Vulcan 8 ton std. gauge, gas
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Heltzel 85 ton, 3 compt. Steel Bin, weigh batcher
Rex 28S Mixer on skids, almost new
Bulk Cement Bin, 350 bbls. Complete
Blaw-Knox 100 ton, 3 compt. Aggregate Bin
Heltzel 100 ton, 3 compt. Aggregate Bin

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300 CFM Chi. Pneu. with 75 H. P. motor
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CRUSHERS
24″ x 54″ Superior Crushing Rolls
#3 McCully Gyratory
#6 McCully Gyratory
#7½ K Gates Gyratory
#4 D Gates Gyratory

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100 H.P. Northern G.E. Type 220 V D.C.
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75 tons per hour, consisting of
One—double deck 3x10 Lippman Vibrating Washing screen
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One—12x36 Lippman Jaw Crusher
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1100 ft. 5″ Wrought Iron Pipe
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Plant now operating. Available soon. All equipment less than 2 years old.

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1—8″ Fuller-Kinyon Pump
1—10″ Fuller-Kinyon Pump
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1—17-ton Vulcan Steam Locomotive
1—17-ton American Steam Locomotive
1—8-ton Vulcan Gasoline Locomotive
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Elevators
Drag Chains
Blowers
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Fuller Coal Feed Screws
Speed Reducers—Various Sizes from 2 to 50 H. P.
Bins
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Bag Sewing Machines
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Miscellaneous Valves and Piping
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5,000 feet of rubber belt from 24″ to 60″
1—6250 KVA Turbine

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DIESEL: 105, 315, 420, 603, 807 & 1000 Ft.
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50 Skips and Battleship Type, 2 to 6 Yds.
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5 Yd. Monighan Diesel Dragline.

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6'x22" HARDINGE CONICAL Pebble Mill.
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4x16, 5x15, 5x22, & 6x22 Tube Mills.
3½x8 & 5x7 Air Swept Tube Mills.
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4x16 Smidth Tube Mill Silex.
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No. 1 Sturtevant Ring Roll.
RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
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SEPARATORS AND COLLECTORS
14 ft., 8 ft. and 12 ft. Separators

ROLL CRUSHERS
36x60 Fairmont Single Roll.
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24x24 & 36x16 & 36x20 Diamond Double Roll.

JAW CRUSHERS
10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x15, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36.
30x10 Gruendler Roller Bearing.

CONE & GYRATORY CRUSHERS
18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
21K & 18N Allis Chalmers.
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Gruendler No. 6X.

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5—1 yd. 2 yd. & 3 yd. Mixers.
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ASPHALT EQUIPMENT
7—750 & 1000 Gal. Distributor Trucks.
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5—½, 1, & 2 Ton Asphalt Plants.

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60 HP Fairbanks Morse.
140 HP Fairbanks Morse.
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240 K.W. F.M. 3/60/2300 v.
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RAYMOND MILL
5 Roll High Side.

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BELT: 1000 Ft. 60 In., 700 Ft. 42 In., 600 Ft. 36 In., 800 Ft. 30 In., 1642 Ft. 24 In., 517 Ft. 20 In., 297 Ft. 18 In., 1000 Ft. 14 In. & 16 In.
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Head & Tail—Pulleys—Takeup for all sizes.
Steel Frames: 2,000 Ft. 24 In., 30 In. & 36 In. Sections.

ROTARY DRYERS AND KILNS
36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 Ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft., 5x30 & 8x84 Double Shell Dryers, 8x110, 7½x100, 8x125 & 10x20 Kilns.

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GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom.
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom.

LOCOMOTIVES
DIESEL: 7—4½, 8 and 15 Ton 36 & 42 In. Ga.
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton.
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 17 Ton & 40 Ton.

SCREENS
VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72. HUMMER, ROTEX, NIAGARA & ROBINS, LINK BELT & HURON.
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35—4000, 5000, 6000, 8000, 10000, 15000 and 20000 gal. cap. Horizontal and Vertical.
50000 gal. on 100 ft. tower.
60000 gal. on 85 ft. tower.
100000 gal. on 100 ft. tower.

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12—50 Ton Cap. Battleship Gondolas.
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1— ¾ yd. Gas 1—1½ yd. Electric
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125 Ton 56' x 10'6" Platform 4 Section.

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JAW CRUSHERS: Farrell 10 x 30", 10 x 36", 13 x 30", 18 x 36". Champion 10 x 20", 10 x 40", 22 x 50". Buchanan 12 x 36". Carroll 24 x 36".

SINGLE ROLL: McLanahan 18 x 24", 18 x 30", 21 x 42", 24 x 48".
MECO 18 x 30" with feeder & conveyor.

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6" Steel Dredge, Gas Drive, complete.
Steel Dredge Boat only, 18 x 38'.

SHOVELS, DRAGLINES, CRANES
1¼ yd. P&H GA-2 Gas Air Shovel.
½ yd. Insley and Bay City Shovels.
¾ yd. Speeder, B-1 & P&H 206 Combination.
1 yd. Northwest, 6 cyl. Gas Engine.
2—Bucyrus Class 14 Steam Draglines 60 & 65' booms.

DIESEL ENGINES: 25 to 300 HP, some with Generators.
Natural Gas and Gasoline Engines.
200 KW & 400 KW 250 volt DC Generators D/C to Steam Engines, One Uniflow.
24" x 36" Gauge Gasoline Locomotives, various weights.
1½, 2, 3, 4, 5 yd. Steel Dump cars 24 x 36" gauge.
Air Compressors, Elevators, Conveyors, Screens, Motors, etc.

SPECIAL
Diamond Vertical rotor lift Crushing plant, with 15 x 24" jaw, 26 x 20" roll Crusher, 4' x 8' Vib screen, 30" x 5' Feeder with Murphy Diesel Engine, mounted on Pneumatic Tires, Excellent. Now in operation.

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Pa 2290 710 Eastgate, St. Louis 5, Mo.

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CRUSHERS
24" x 48" McLanahan
12" x 24" Webb City Jaw
8" x 14" Gruendler Jaw
24" Symons Disc

22,000 GAL. STEEL TANK
On 50' Tower
Excellent Condition

INSLEY GUY DERRICK
Electric 75' Boom 85' Mast

ELECTRIC MOTORS
10 H.P. to 200 H.P.
All types and speeds

2—100 ton Watson Stillman Jacks.

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BUCKET ELEVATORS
Enclosed 16" bucket-belt elevator, 120'
Enclosed 12" bucket-belt elevator, 88'
Enclosed 8" bucket-belt elevator, 85'
Enclosed 6" bucket-belt elevators, 35' & 50'
Open 16" bucket-chain elevator, 50'
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Open 20" bucket-9 ply belt elevator, 52'
Continuous 14" bucket elevators, 40-60'
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New 9 ply rubber covered 22" elevator belt
Used 6 ply 20" elevator belt
Gears, sprockets, elevator and drive chain
New K2 couplings for C102½ & C188 chain

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36" x 175' trough belt conveyor equipment
14" x 100" trough belt conveyor equipment
Selected lot of belt idlers and end pulleys
400' of 6 ply 36" conveyor belt
350' of 6 ply 14" conveyor belt
Lot of 14", 16", and 18" conveyor belt
180' of 8 ply 42" conveyor belt
Single strand flight conveyors, 11" & 15"
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Jeffrey Foundry Mold conveyor, 42" x 150'
Jeffrey Standard Steel Apron Feeder, 24" x 60'
4 Robins Automatic belt trippers for 14" belt
2 Hand propelled trippers for 24" & 30" belt

CRUSHERS, ROLLS, MILLS
Jaw crushers—9" x 16", 11½" x 20½", 18" x 32"
Traylor 11" — **"BULLDOG"** gyratory crusher
Robins double roll spiked coal crusher, 24" x 30"
Stevenson single roll coal crusher, 24" x 39"
Single roll spiked coal crusher, 24" x 24"
Simplex coal pulverizer, type 33A, 1800 rpm
American Standard Disintegrator, 24" x 18" x 30"
Sturtevant No. O Rotary Fine crusher
Williams No. 2 **"SEMI-VULCANITE"** hammer mill

SCREENS, WASHERS
Niagara double deck vibrating screen, 2' x 10'
Jigger triple deck vibrating screen, 2' x 5'
Hummer vibrating screens and Tyler generators
New **"TONCAP"** framed screen cloth, 3' x 5' & 4' x 5'
REVOLVING SCREENS, 42" x 18', 4' 16', & 5' x 20'.
Link-Belt sand drag washer, 36" x 20'

MISCELLANEOUS
Chicago Air compressor 528' 100 hp AC motor
Schramm 4 cyl. compressor 360', 60 hp AC motor
I-R compressor 275', direct to Waukesha engine
2 Meyers stone saws, 60" & 48"; 3 Lincoln planers
New York Air Brake 6B steam air compressor
Morris 6" manganese lined sand pump, 75 hp motor
Electric, belt and gasoline driven water pumps
Whitcomb 8 ton 36" gauge gasoline locomotive
Mercury 1½ ton 30" gauge battery locomotive
Sprague Electric car puller, direct current, 6 ton
Cargo type car puller, 15 hp motor, 25 cycle, 440 V
V shape 36" gauge 2 yard end dump car
Flat cars for 20" & 24" gauge track
Cast turntables 48" dia. 27" gauge, ball bearing.

G. A. UNVERZAGT & SONS
136 Colt Street, Irvington, New Jersey

Gyratory Crushers: 27", 21", 18", 12", 10", 8".
Newhouse 7" gyratory reduction crushers (2).
Champion 24"x50" rock jaw crusher, steel.
P&H ¾-yd. 206 gas shovel-dragline, bucket.
Bucyrus-Erie gas-air shovels. 1¼-yd., A-1, (2).
Plymouth 25-ton gasoline locomotive, std. ga.
Vulcan 17-ton locomotive, steam, 36" gauge.
Porter 18-ton locomotive, steam, 36" gauge.
Davenport 19-ton locomotives, steam, 36" ga. (2).
(Above steam S/T locos. 100% rebuilt, tested)
Industrial railway outfit, 2000', 14 cars, two 7-ton gas locomotives, all 24" gauge.
Pioneer 300W portable gravel washing plant.
Portable rock crushing plant, Universal, duplex.
Worthington 5'x40' rotary dryer, direct, ½".
Euclid 6-yd. bottom dump crawler wagons (8).
Toepfer revolving gravel screen, 48"x18'.
Hayward orange peel and clamshell buckets, (6).

H. Y. SMITH CO.
828 N. Broadway Milwaukee 2, Wis.

1—25 Ton Steel Stiff Leg Derrick, 70 ft. boom, 50 ft. mast, 2 drum Hoist.
1—20 Ton capacity Steel Stiff Leg Derrick, with 60' Boom and 49' Mast.
1—170 KVA Motor Generator with F. M. 228 HP Diesel engine for 220/3/60 AC.
1—1¼ Yd. P & H 600 Caterpillar Gas Shovel.
1—30 Ton Cap. Brownhoist Steam Locomotive Crane with 45' Boom, Code Boiler. Splendid operating condition.
1—15 Ton Brownhoist Steam Loc. Crane 47 ft. boom.
1—15 Ton Brownhoist Steam Loc. gas operated with 2 booms.
1—2½ Yd. Diesel Dragline Caterpillar Crane with 60' Boom.
1—1 Yd. Marion Electric Shovel with Cummins Diesel Engine.
1—8 Ton Plymouth Gas Locomotive 36" Gauge Climax Engine.
2—1 Yd. 4 Blade Orange Peel Buckets.
1—¾ Yd. 3 Blade Orange Peel Bucket.
2—Appleton Air Hose Reels, like new.
1—1 Yd. Hayward Electric Clam Shell Bucket, **220 D. C.**
1—No. 7½ McCully Gyratory Crusher.
1—8 Ton Morgan Single Drum Mine Hoist with 400 HP AC Motor.
1—Columbia Scrubber Screen.
1—Symons 36" Disc Crusher.
1—11x22—No. 10A Acme Jaw Crusher.
1—No. 4 Austin Gyratory Crusher.
1—12" H & B Flap Valve.
1—No. 3 Williams Swing Hammermill.
10—12" & 16" American Wire Rope Sheaves.

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Phone—Harrison 0725
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Speed-Ace
TRACTOR WAGONS
7½-yd. Cap.
In good condition
Write for illustrated bulletin.
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Hoists—Air, Steam, Electric, Gas
Cranes & Buckets
FOR RENT—FOR SALE
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We Own and Offer

NEW & USED EQUIPMENT

SPECIAL
DIESEL GENERATING UNIT— Fairbanks-Morse 6 cylinder "YVA" 300 HP—250 KVA.
TURBINE GENERATOR—Westinghouse 1000 KW—250 V.—D.C.
ROTARY CONVERTER—1000 KW Westinghouse, Transformer and auxiliaries.
TURBINE—100 HP Westinghouse 2700 RPM, gear reduction.
AIR COMPRESSOR—I.R. Duplex, 100 HP motor and receiver.
STEEL GUY DERRICK—110' mast 90' boom —3 drum Clyde hoist, electric.

AGITATORS
23—For 12' x 12' tanks, and others.

DRYERS
1—3½ x 44 ft. and others.
1—7' x 56' Rotary Coal Dryer.

FEEDERS
2—**BAILEY FEEDERS,** Type No. 2, complete with steel hoppers, 8½ dia. x 12 ft. cone bottom.

KILNS & COOLERS
Vulcan 7' x 120', like new. Also various others.

CRANES
1—**LOCOMOTIVE,** 4-wheel, 10 ton, 25' boom, Brown Hoisting Co.
1—**OVERHEAD,** 10 ton, 74' span, air operated.

DREDGES, TUGS & SCOWS
1—**DREDGE,** steam, steel hull, bucket type.
1—**TUG,** steam, steel hull.
3—**SCOWS,** steel.
1—**MACHINE BOAT,** steel, marl cutter.

GRINDING EQUIPMENT
1—**CRUSHER,** Kennedy No. 14 Gyratory.
1—**PUG MILL,** 15" diameter x 8½' with heaters.
1—**TUBE MILL,** 5½' x 20', F. L. Smidth Co.
1—**TUBE MILL,** 5½' x 22'.
2—**RAYMOND MILLS,** 4 rolls.

SCREENS
4—**SINGLE DECK HUMMER SCREENS,** 4' x 5' complete with feeder and generator.
2—**SINGLE DECK HUMMER SCREENS,** 4' x 5'.
1—**TRIPLE DECK KENNEDY SCREEN.**

BELT CONVEYORS
1—**CONVEYOR,** 120' x 24", ball-bearing, rollers and idlers, complete with belt, like new.

MISCELLANEOUS
1—**WAGON DRILL,** Gardner-Denver.

SYNCHRONOUS MOTORS
1—1900 HP, 25 cycle, 2300 V.
2—1250 HP, 25 cycle, 2300 V.

WANTED: DIESEL & GENERATING EQUIPMENT

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New and Used Equipment
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Good 60" x 15' locomotive type boiler complete. Approximately 900 sq. ft. heating surface.

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1—Kennedy "49" with motor in pulley.

AIR COMPRESSORS

1—12"x10" Ingersoll-Rand ER-1, with 50 H.P., 3/60/220 v. motor, receiver, etc. 355 CFM, 100 lb. pressure.
1—315-A Ingersoll-Rand Portable Air Compressor, 2-stage, 100 lb. pressure, Hesselman oil engine drive. Rebuilt.
1—4000 CFM Nordberg, driven by 750 H.P. Diesel Engine, 100 lb. pressure.

BELT CONVEYORS

24"x125'
24"x150'
14"x32'

CRUSHING ROLLS

1—20"x14" Sturtevant, full balanced type.
1—Set 36"x16" Sturtevant.
2—40"x16" Colorado Iron Works.
1—42"x16" Allis-Chalmers.

VIBRATING SCREENS

9—Tyler Hummers; 3'x5', 4'x5', one and two-deck.
1—4'x6' Kennedy, double deck.
1—3'x6' Niagara.
1—2'x3' Telsmith.

RAYMOND PULVERIZERS

2—4 roll low side Mills, each with fan.

ROTARY KILNS

1—7'x120' Vulcan, excellent condition, complete, out of service six weeks.
1—7' & 8'x80' Traylor.
3—5'6"x7'x80' Vulcan and Reeves.
1—5'x50' Vulcan.

DIRECT HEAT ROTARY DRYERS

2—4'x30' Ruggles-Coles.
1—5'6"x24' Iroquois, made by Lancaster Iron Works.
1—5'x30' Cummer.
2—5'x40' single shell.
2—6'x50' Traylor Eng. & Mfg. Co.

SPECIAL

3—70"x30' Ruggles-Coles Type A-9 double shell Direct Heat Rotary Dryers.

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1—UNUSED 7'x23'9" Tube Mill, iron lined, including 400 H.P. 3/60/2200 volt slip ring motor and starting equipment.
1—5'x20' Bonnet Tube Mill, silex lined, cast steel heads, for direct gear drive.

MISCELLANEOUS

1—Williams 1½ cu. yd. capacity "Hercules" Lever Arm type Clamshell Bucket.
1—Hayward 1 yd. rehandling Clamshell Bucket.
6—Asphalt Distributors, 1000 gal. capacity, on Diamond T Motor Trucks.
1—8' Denver Hydro-Classifier for fine sizing—complete with motors.
1—Link-Belt Portable Belt Conveyor, 18" wide x 21' long.

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20—Tons Forged Steel Balls, 2" to 4"
3—Allis Chalmers Crushing Rolls, 36" x 15", 28" x 15"
2—Blake Jaw Crusher, 10" x 20", 9" x 15"
1—American Continuous 3 Leaf Filter, 135 sq. ft. area
1—Oliver 8', x 3½' Rotary Filter
5—Dorr Thickeners, 10' x 10', 15' x 10', 20' x 10'
1—Dorr Thickener, 3 deck, 30' x 15'
3—Janney 4 Compartment Classifiers
14—Trommel and Callow Screens
1—Reedy Hoist Elevator
5—Fairbanks Floor Scales, 5000 lb.
3—Air Compressors, 9" x 6", 14" x 8", 10" x 6"
10—Bucket Elevators, 30' to 75' centers
8—Belt Conveyors, 20' to 50' centers
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25—AC Motors, 5 to 100 HP

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3—Bucket Elevators, 25' to 50' centers
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1—Vulcan 6' x 42' Rotary Dryer
4—Rotary Dryers, 4' x 30' to 6' x 64'
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5—Tyler Hummer Screens, 3' x 5', 4' x 5'
1—Jeffrey Type "A" Hammer Mill, 36" x 24"

Partial List Only. Your inquiries solicited.

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PRICED FOR QUICK SALE

1—Allis-Chalmers Blake Type Jaw Crusher 10"x20" $800.00

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2—1 yd. Northwest No. 4, Serial Nos. 3441, 3493, 60' booms.
3—¾ yd. Koehring cranes, Model 301, with 45' boom, Serial Nos. 544, 772 and 840. Gasoline powered.
1—¾ yd. P & H Model 400 crawler crane, Serial No. 4136, with 40' boom gasoline powered.
1—½ yd. P & H shovel Model No. 204, Serial No. 2303, gasoline powered.
1—½ yd. Northwest No. 2, Serial No. 2908, comb. crane and shovel.
1—¾ yd. Erie Model B2 crawler crane, steam powered, Serial No. 4027, with 50' boom and shovel attachment.

CRUSHERS

1—9x16" Climax jaw crusher, No. 2.
1—9½x24" United Iron Works jaw crusher "Blake Type."
1—10x16" Buchanan jaw crusher.
1—9x16" Acme jaw crusher, No. 1686.
1—12x20" Acme jaw crusher, No. 1873.
1—7½x13" Champion jaw crusher, No. 3.
1—6x9" Holland jaw crusher, No. 9.

DERRICKS

3—Steel Guy Derricks: 1—20-ton American Terry, 110' mast, 100' boom. 1—5-ton Terry Guy Derrick, 70' mast, 60' boom; 1—5-ton Insley, 75' mast, 80' boom. Stiff leg derricks: 1—25-ton Hunter, 40' mast, 80' boom; 1—2-ton Pittsburgh, 26' boom, 15' mast. Also a number of wood stiff leg derricks, 1 to 5-ton cap.

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150, Box, 36-Ft., 40-Ton; Steel Ends
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2, Dump, Western, Automatic 20-Yd., 40-Ton
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No. 38-Type S Kennedy Reduction Crusher with synchronous motor
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No. 37 Standard Kennedy Reduction Crusher
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1—50 ton Porter 0-4-0 standard gauge saddle tank switcher, National Board and Ohio standard boiler. Built 1928.
1—33 ton Vulcan 0-4-0 standard gauge saddle tank switcher, ASME boiler.
1—72½ ton Baldwin 0-6-0 standard gauge separate tender switcher, 20x26" cylinders. Full time ICC papers.
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1—40 ft. steel underframe flat car, 50 ton.
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1—300 KW 600 Volt G.E. Switchgear
4—27' Center 24" Bucket 26" Belt Elevator
1—60 H.P. PTE DD Sauerman Hoist
1—37 H.P. 48 x 42 SD National Hoist
3—35 H.P. National DD Tugger Hoists
2—45 H.P. Ingersoll-Rand Tugger Hoists
1—80-ton Baldwin Locomotive
5—4" Dorreo Diaphragm Suction Pumps
1—6" 12 Stage 30 G.P.M. Turbine Pump
1—100 ton cap. 28' Rail F.M. Track Scale
1—Marion Model 4160 4-yd. Electric Shovel No. 6538
2—Model F-32 Athey Side Dump Wagons
1—5' x 7' Robins Eliptex Single Deck Screen
1—6' x 27' DSFX—8347 Dorr Classifier
1—4' x 30' SSFB—1812 Dorr Classifier
1—8' x 31' DSFX—987 Dorr Classifier
1—8' x 30' DSDB—X367D Dorr Classifier
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Blue Ball, Pennsylvania

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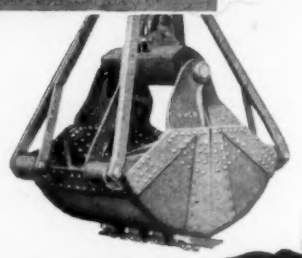

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Index to Advertisers

*Allis-Chalmers Mfg. Co. 33
*American Cable Div. American Chain & Cable Co., Inc. ..... Inside Back Cover
American Manganese Steel Co. 113
*American Pulverizer Co. 112
American Rubber Company 149
*American Steel & Wire Company. 51
Anchor Concrete Machy. Co. 139
Atlas Powder Co. 26
*Babcock & Wilcox Co. 62
Bacon, Inc., Earle C. 122
*Barber-Greene Co. 143
Barrett Cravens Company 145
Bemis Bro. Bag Co. 30
*Bethlehem Steel Co. 28
Birmingham Rail & Loco. Co. 163
Blaw-Knox Company 128
Brill Equipment Co. 162
Broadcast Section 154-163
Broderick & Bascom Rope Co. 125
*Brooks Equipment & Mfg. Co. 116
*Buda Company, The 39
Builders-Providence, Inc. 120
Burnham, Royal E. 160
*Butler Bin Co. 144
Carlyle Rubber Co., Inc. 154
Cashman, John 159
Chain Belt Company 136
Chicago Perforating Co. 123
Chicago Pneumatic Tool Company 31
*Chicago Steel Foundry Co. 106
Chilean Trading Corporation 156
Cleveland Rock Drill Co. 42
Cleveland Wire Cloth & Mfg. Co. 151
Climax Engineering Company 121
Clipper Manufacturing Co. 135
*Colorado Iron Works Co. 56
Columbia Steel Company 51
Columbus Conveyor Company 128
Commercial Shearing & Stamping Co. 139
Consereo, Inc. 147
Consolidated Products Co., Inc. 161
Continental Gin Company 32
Cummins Engine Company 25
Davenport Locomotive Works 149
*Dempster Bros., Inc. 46
*Denver Equipment Co. 152
DeSoto Foundry, Inc. 126
DeWitt Hotels 152
*Diamond Iron Works, Inc. 40
*Dixie Machinery Mfg. Co. 105
Duquesne Elec. & Mfg. Co. 159
Eagle Crusher Company, Inc. 151
*Eagle Iron Works 126
*Easton Car & Construction Co. ... 1
*Ensign-Bickford Co., The 38
Equipment Corp. of Am. 158-162
*Erie Steel Construction Company. 123
*Euclid Road Machy. Co. 45
Flexible Steel Lacing Co. 150
Frog, Switch & Mfg. Co. 122
*Fuller Co. 48
Gates-Rubber Co. 4
General Electric Company 10
General Excavator Company 114
*Gruendler Crusher & Pulv. Co. 150
Gulf Oil Corp. 5
Haiss Mfg. Co., Inc., Geo. 122
Hanson Clutch & Mach. Co. 127
*Hardinge Company 119
Hawkins & Company 158
Heat and Power Company 161
*Hendrick Mfg Co. 152
Hendy, Joshua, Iron Works 15
Hercules Company, The 114
Hercules Powder Co. 34
Hercules Steel Products 117
Hills-McCanna Company 127
Hotel Philadelphia 152
Hunter Tractor & Mach. Co. 158
Industrial Brownhoist Co. 118
*Ingersoll-Rand 36
*Iowa Manufacturing Co. 11
Iron & Steel Products 156, 162
Jackson & Church Co. 129
*Jaeger Machine Co. 145
*Jeffrey Mfg. Co. 47
Jones Foundry & Machine Company, The W. A. 124
Kansas City Hay Press Co. 151
*Kennedy-Van Saun Mfg. & Engr. Corp. 17
Kent Machine Co. 139
King Powder Co., Inc. 2
Koehring Company 18
Kremser & Sons, Inc., Frank A. 163
Lane Company, The T. J. 159
*Laughlin Co., Thomas 109
LeTourneau, Inc., R. G. 27
Lime & Hydrate Plants Co. 20
*Link-Belt Co. 153
Ludlow-Saylor Wire Co. ..... Inside Front Cover
Machin Company, The E. C. 116
Mack Trucks, Inc. 54
Macmillan Petroleum Corporation. 6
Marietta Concrete Corporation, The 153
McGann Manufacturing Co. 20
*McLanahan & Stone Corp. 153
*Merrick Scale Co. 106
Mid-Content Equipment Co. 157
Mine & Smelter Supply Co. 12
Mir-o-Col Alloy Company 128
*Morris Machine Works 107
Motor Truck Sales & Equipment Company 146-155
Mott Core Drilling Company 152
*Multiplex Concrete Machy. Co. 142
Murphy Diesel Company 35
National Supply Co. 52
*National Wire Cloth Co., Inc. 141
Naylor Pipe Co. 111
Neff & Fry Company 141
Newell Company, The William W. 157
New Holland Machine Co. 123
Nicholson Company, The 115
*Nordberg Mfg. Co. 14
*Northern Blower Co., The 110
Northwest Engineering 57
O'Neill, A. J. 161
Osgood Company, The 114
Ottawa Steel Products, Inc. 149
*Owen Bucket Co. 164
Page Engineering Co. 125
Patterson Equipment Co. 163
Pennsylvania Drilling Co. 160
Philadelphia, Hotel 152
*Pioneer Engineering Works, Inc. . 43
Porter Co., H. K. 112
Portland Cement Association 145
*Quaker Rubber Corp. 16
Quimby Pump Company, Inc., Division of H. K. Porter Company, Inc. 112
Railway Accessories Company 156
Raybestos Division of Raybestos Manhattan, Inc. 41
*Raymond Pulverizer Div. of Combustion Engineering Co., Inc. 22-23
Republic Rubber Company 101
Robins Conveyors, Inc. 37
St. Regis Paper Company 44
*Sauerman Bros., Inc. 139
Schaffer Poidometer Co. 118
Schramm, Incorporated 61
Scientific Concrete Service Corp. . 134
Sheppard Company, The R. H. 49
*Sly Mfg. Co., The W. W. 103
*Smidth & Co., F. L. 152
Smith Engineering Works 55
Solo Works, Inc. 153
Southern Iron & Equipment Co. . 163
Sprout, Waldron & Co., Inc. 120
Standard Metal Mfg. Co. 152
Stanhope, Inc., R. C. 157
*Stearns Mfg. Co. 148
"Stone," the Crane Man 159
*Sturtevant Mill Co. 19
Superior Engine Division The National Supply Co. 52
Swift, Incorporated, William P. . 163
*Syntron Co. 134
Taylor Forge & Pipe Works 8
Texas Company, The 59
Thermoid Rubber, Division of Thermoid Company 21
Thew Shovel Co. 3
Thomasville Stone & Lime Co. 154
*Traylor Engineering & Mfg. Co. ... 7
Trojan Powder Company 13
Twin City Iron & Wire Co. 151
*Tyler Co., The W. S. 123
United States Rubber Company .. 29
*United States Steel Company 51
Universal Concrete Pipe Company. 145
Universal Engineering Corp. 24
Universal Road Machy. Co. 149
Universal Vibrating Screen 152
Unverzagt & Sons, G. A. 157
Vulcan Iron Works 53
Walsh Co., Richard P. 156
Webber Equipment Company 158
Wellman Engineering Co. 124
*Western Precipitation Corp. 108
Whayne Supply Co., Roy C. 155
*Williams Pat. Crusher & Pulverizer Company 151
Wisconsin Motor Corp. 150
Wood's Sons Company, T. B. 9
Worthington Pump and Machinery Corp. ....164, Outside Back Cover

***See also Detailed Information in 1943 Pit and Quarry HANDBOOK**

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Davenport—Industrial Engineering Equipment Co.
KENTUCKY—Harlan—Hall Equipment Sales
Louisville—Williams Tractor Company
LOUISIANA
New Orleans—Wm. F. Surgi Equipment Co.
MAINE—Ellsworth—Murray Machinery Co.
MARYLAND
Baltitmore—D. C. Elphinstone, Inc.
MASSACHUSETTS
Boston—P. I. Perkins Company
Cambridge—W. W. Field & Son, Inc.
Springfield—The Holmes-Talcott Company
MICHIGAN
Detroit—W. H. Anderson Company, Inc.
MINNESOTA
Hibbing—Arrowhead Equipment & Supply Co.
Minneapolis—The George T. Ryan Company
MISSOURI
Kansas City—Machinery & Supplies Company
St. Louis—Ryan Equipment Co.
MONTANA—Helena—Caird Engineering Works
NEW HAMPSHIRE
West Lebanon—P. I. Perkins Company
NEW JERSEY
Hillside—P. A. Drobach
North Bergen—American Air Compressor Corp.
NEW MEXICO
Albuquerque—The Harry Cornelius Company
NEW YORK
Albany—Larkin Equipment Company
Albany—T. Southworth Tractor & Machy. Co., Inc., Menands
Binghamton—MacDougall Equipment Co.
Buffalo—Dow & Company, Inc.
Corona, L. I.—The Jaeger-Lembo Machine Corp.
Middleton—S. T. Randall, Inc.
New York—Hubbard & Floyd, Inc.
Olean—Freeborn Equipment Company
Oneonta—L. P. Butts, Inc.
Syracuse—Harrod Equipment Company
NORTH CAROLINA
Durham—Constructors Supply Company, Inc.
OHIO—Cincinnati—The Finn Equipment Co.
Cleveland—Gibson-Stewart Company
Marietta—Northwest Supply & Equipment Co.
Toledo—M. W. Kilcorse & Company
OKLAHOMA
Oklahoma City—Townsco Equipment Co.
OREGON
Portland—Andrews Equipment Service
PENNSYLVANIA
Easton—Sears & Bowers
Harrisburg—N. A. Coulter
Oil City—Freeborn Equipment Company
Philadelphia—Metalweld, Inc.
Pittsburgh—John McC. Latimer Company
Wilkes-Barre—Ensminger & Company
SOUTH CAROLINA
Columbia—Bell-Lott Road Machinery Co.
SOUTH DAKOTA
Sioux Falls—Empire Equipment Co.
TENNESSEE
Chattanooga—James Supply Company
Knoxville—Wilson-Weesner-Wilkinson Co.
Memphis—Tri-State Equipment Company
TEXAS—Dallas—Shaw Equipment Company
El Paso—Equipment Supply Co.
Houston—Dye Welding Supply Co.
San Antonio—Patten Machinery Company
UTAH—Salt Lake City—The Lang Co.
VIRGINIA
Richmond—Highway Machinery & Supply Co.
WASHINGTON
Seattle—Star Machinery Company
Spokane—Andrews Equipment Service
WEST VIRGINIA
Fairmont—Interstate Engineers & Constructors
WISCONSIN
Eau Claire—Bradford Machinery Company
Green Bay—Nelson Machinery Company
Madison—Western Equipment Company
WYOMING
Cheyenne—Wilson Equipment & Supply Co.

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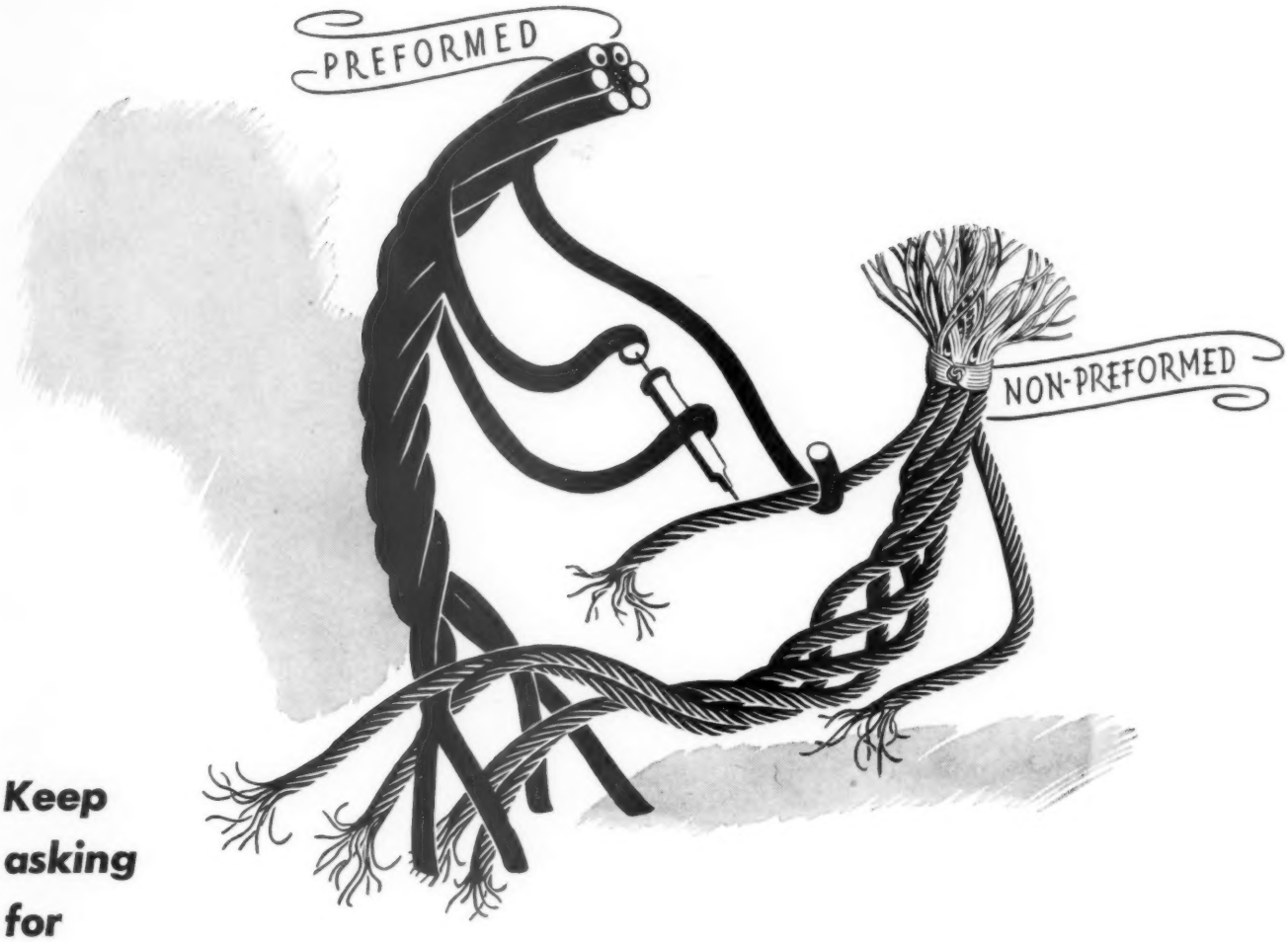

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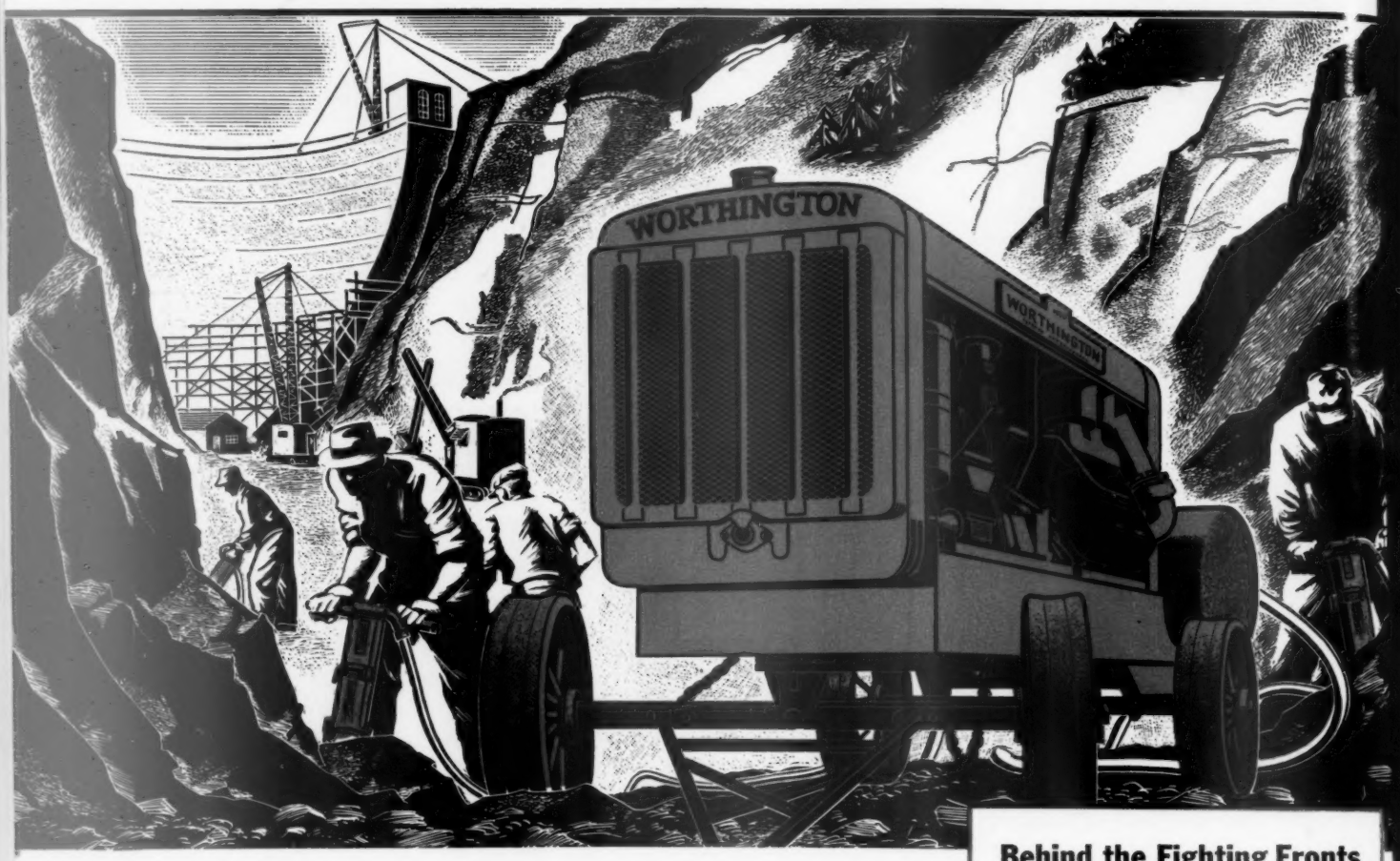
TO TAME A POST-WAR FLOOD



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*Blue Brute Compressors and Air Tools are painted olive drab for the Army. **Reg. U. S. Pat. Off.

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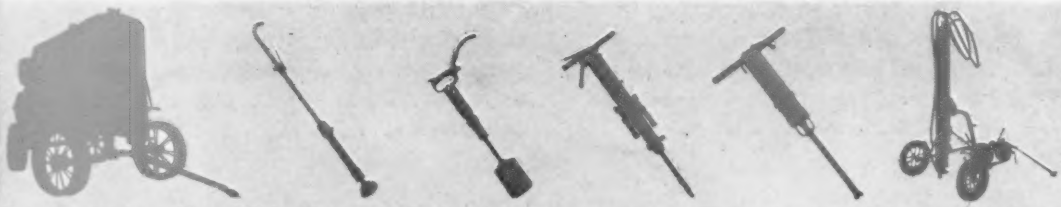

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